Huberman Lab — All episodes

Huberman Lab Keypoints

Episodes in this pack: 217

How Food Choices Shape Memory, Cognition & Cravings | Dr. Scott Kanoski

Guest: Dr. Scott Kanoski
Date: 2026-10-12 · Duration: 2:02:06
URL: https://www.youtube.com/watch?v=PXHRYbr3mp4

KEYPOINTS

1. GLP-1 drugs push GLP-1 far above anything the body makes naturally
GLP-1 drugs were first used for diabetes and only later became known for weight loss. Huberman notes they raise GLP-1 roughly a thousandfold above natural levels, and Kanoski agrees that is 'supra-physiological for sure.' What that means over the long term, good or bad, is still being worked out.

2. GLP-1 receptors sit all over the brain, so the drugs may matter beyond appetite
The receptors aren't limited to appetite and blood-sugar centers. They are dense in reward circuitry (the VTA, striatum and nucleus accumbens) and in the hippocampus, Kanoski's favorite region. Animal data support uses for substance-use disorders and possibly memory disorders and dementia. Human trials are only now coming out.

3. Whether the drugs actually get into the brain is still disputed
Rodent work from 2005–2012 on first-generation drugs suggested much of the appetite effect came from acting on the brain. Better tracer studies are now under way, using carbon-14-labeled peptides, from Elizabeth Rhea, Bill Banks and colleagues at the University of Washington. Early-generation drugs appear to enter the brain readily. For the newer drugs it's unclear, and where they act is not well understood.

4. Natural GLP-1 works locally on the vagus nerve to end a meal
L-cells in the intestine release GLP-1, which acts right next door (paracrine signaling) on GLP-1 receptors at the gut endings of the vagus nerve. The vagus carries 'within-meal' signals to the brainstem, the first brain site told that enough food has arrived. Kanoski calls GLP-1 one instrument in a 'symphony' of stomach-stretch and nutrient signals that produce fullness and stop eating. Neither man experiences 'food noise' himself, so they could only guess at what the drugs quiet.

5. Your memory of a meal shapes hunger hours later
Fullness right after eating follows what you actually ate, which Kanoski calls 'the wisdom of the body.' A few hours later, hunger ratings track what people think they ate. That makes the hippocampus, the brain's memory center, part of appetite control, not just a store of facts.

6. A Western-style diet impairs hippocampal memory in animals quickly
His lab's 'Western diet' gets about 35% of calories from fat and 15% from mostly simple sugars. In rodents it can impair hippocampus-dependent memory within about a week, though most studies run a few months. The hippocampus seems more vulnerable than other memory systems. Teenage exposure has been a major focus of his lab.

7. Diet in midlife is linked to later dementia risk
Human prospective studies link midlife diet and metabolic health, including visceral (belly) fat, to dementia risk. In mice engineered to develop Alzheimer's-like disease, a Western diet makes symptoms appear earlier. Kanoski sees diet as prevention across a lifetime rather than a treatment once symptoms start.

8. Exercise can rescue diet-induced memory deficits in rats
Rats switched from an unhealthy diet to a healthy one can keep long-lasting memory deficits, and exercise reversed them. Kanoski thinks the benefit comes partly from better metabolism and partly from direct changes in the brain.

9. Gut signals reach the hippocampus through a three-step acetylcholine pathway
Vagus nerve signals reach the brainstem, which projects to the medial septum. Acetylcholine-producing neurons there connect to the hippocampus. His lab is studying acetylcholine as the 'currency' of this gut–brain–memory link and asking whether disrupting the vagus nerve matters for Alzheimer's.

10. Dopamine responses to sweet foods can be retrained
Rats show a dopamine response to sucrose, or to a cue that predicts it. If sucrose is paired with a few minutes of drug-induced sickness, that response disappears. Kanoski calls this an extreme example of how flexible the reward system is. He notes that old punishment-based approaches in humans (shock, nausea) were unethical, and he knows of no good evidence they work, for example for quitting smoking.

11. Oxytocin reduces eating mainly through the brainstem
Oxytocin has long been known to suppress appetite. Work by Harvey Grill and others points to the brainstem as its strongest target. Oxytocin is made in the hypothalamus (the PVH) and released into the blood, and some oxytocin neurons project straight to the brainstem.

EXAMPLES

1. Artificial sweeteners in adolescent rats
Juvenile and adolescent rats got a daily sweetener dose within FDA acceptable-daily-intake levels, which he estimated at something like six servings a day, and drank it voluntarily. Tested as adults after the sweetener had stopped, they showed unexpected memory problems and changes in blood-sugar regulation. The mechanism is unknown and this is a single rodent study.

2. The 'magic soup bowl' experiment
Bowls were secretly refilled or drained, so people might see 300 mL while eating 500, or the reverse. Right after the meal, hunger matched what they actually ate. Hours later, it matched what they thought they ate.

3. People with amnesia eating three lunches

In studies Kanoski credits to Paul Rozin, patients with severe amnesia (memory spans of roughly 10–40 seconds) ate a second and third meal when offered, and still rated their hunger about 7/10. Their gut was signaling, but without the hippocampus they couldn't interpret it. Rats with hippocampal lesions likewise can't use internal hunger states as cues.

4. Heat-treated 'AGE-enriched' food and gut bacteria

Heating food creates advanced glycation end-products (AGEs, which act on the RAGE receptor). Rats raised on an AGE-enriched diet had memory impairments as adults. Heating wiped out a Lactobacillus population whose levels tracked memory performance, and restoring that bacterium rescued memory. This work is unpublished, at the preprint stage.

5. Vagotomy and dementia in Taiwan

In the 1980s and '90s, surgeons in Taiwan sometimes cut the main vagus nerve trunk to treat stomach ulcers. One small records study found a positive link with later dementia. Kanoski's group plans to check this in the Swedish national registry.

6. Why people stop GLP-1 drugs

Kanoski says most people stop within two years, mainly because of side effects. In older adults, loss of lean (muscle) mass is another reason; weight loss always removes some lean tissue along with fat. To his knowledge clinical trials haven't shown micronutrient deficiencies, and most trials include diet and exercise guidance.

OTHER RELEVANT

1. Treat diet as long-term brain protection

Animal and human data point to limiting excess simple sugar and saturated fat, especially in adolescence and midlife, rather than hoping to fix memory problems later.

2. Pair GLP-1 drugs with lifestyle changes

Trial results come with nutrition and activity guidance built in. 'Simply taking a pill is not the optimal way' to lose weight, and keeping muscle matters, especially as you age. Data in young people are lacking.

3. Meal timing is individual

Kanoski sees no single recipe for when or how often to eat. Huberman reads intermittent fasting as one effective weight-loss tool among others, and eating below maintenance calories across three meals works too.

4. Feed the microbiome, but expect uncertain answers

Huberman, citing Justin Sonnenburg's work, favors low-sugar fermented foods (sauerkraut, kimchi, kefir), for instance for repopulating gut bacteria after antibiotics. Kanoski notes microbiome science is young: about 7,000 PubMed results a decade ago versus about 250,000 now.

Bringing Extinct Species Back to Life | Dr. Beth Shapiro

Guest: Dr. Beth Shapiro
Date: 2026-10-05 · Duration: 2:15:37
URL: https://www.youtube.com/watch?v=SFX8FIHFLE4

KEYPOINTS

1. 'Species' is a human label, not a biological fact
Shapiro says 'biology doesn't care what species you are.' The biological species concept (Ernst Mayr: can two animals interbreed?), genetic-similarity cutoffs and geographic labels (Florida vs. Texas panther) are all valid tools for different conversations. Her example: Linnaeus named American bison 'buffalo' because Europeans gave that name to any big animal that looked like it would make a good coat.

2. Interbreeding between related lineages is common
Humans and Neanderthals split about 300,000–500,000 years ago. Brown and polar bears split about half a million years ago and still interbreed wherever their ranges overlap, producing 'grolar' or 'pizzly' bears. Ancient DNA from a polar bear that lived off Alaska more than 100,000 years ago already carried brown-bear ancestry.

3. Everyone carries a different 2–5% of Neanderthal DNA
The Neanderthal pieces in one person's genome differ from another's. Pooled across living people, they rebuild more than 90%, possibly over 95%, of the Neanderthal genome. So most Neanderthal DNA wasn't harmful. Most of it sits at about 3% frequency and isn't under selection. The interesting signal is a Neanderthal segment that is suddenly common in a population, which suggests it helped.

4. Neanderthal genomes help pinpoint what makes us human
Comparing humans with chimps means sifting 3–5 million years of change, most of it neutral copying errors; every child has about 100 new mutations compared with its parents. The Neanderthal genome cut the window to 300,000–500,000 years. The roughly 5% of the genome where no living person carries Neanderthal DNA is where the human version was apparently essential.

5. De-extinction means editing a living relative, not Jurassic Park
No DNA survives from dinosaurs, which died out more than 66 million years ago. The oldest DNA ever recovered is from mammoth bone about 1–2 million years old. Colossal sequences extinct genomes, finds the key differences from the closest living relative, and edits those into the relative's cells. Mammoths are closer to Asian elephants than Asian elephants are to African elephants, and the two genomes are already nearly identical.

6. The dire wolves are gray wolves with 20 targeted edits
From fossil dire wolf genomes the team identified variants for bigger size, sturdier build and a light coat, then engineered 20 edits into gray wolf cells. For the light coat they used a route already known to be safe instead of copying the dire wolf variant directly. Romulus and Remus are almost two years old and Khaleesi is about 18 months. They're too closely related to breed, so hormones are used to prevent it.

7. A mammoth is a much harder engineering problem
A woolly coat requires changes not just to hair but to skin: room for more follicles and sebaceous glands. Elephants carry for 22 months and mature at about 14 years, so any edit has to produce a healthy, long-lived animal. Because hundreds of mammoths can't come from hundreds of pregnant Asian elephants, Colossal is developing artificial wombs, for now in mice.

8. Birds can't be cloned, so the dodo drives new tools
Somatic cell nuclear transfer, the Dolly-the-sheep method used for mammals, doesn't work in birds because their egg cells can't be accessed at the right stage. Birds are among the most endangered animals, so the dodo program is meant to develop bird technologies. It was picked partly for wonder: the 'cool beak' and its Alice in Wonderland fame draw public interest.

9. De-extinction and conservation use the same toolkit
Shapiro's answer to 'why not save living species instead?' is that Colossal does both. Excitement about mammoths, dodos and thylacines brings in funding and engagement for technology that also protects living species. Humans have been reshaping ecosystems for tens of thousands of years, by hunting large animals in Australia about 50,000 years ago and in Asia about 30,000 years ago, and then through domestication.

10. Gene drives can be built with limits
Rather than wiping out mosquitoes, Shapiro favors engineering them so they can't carry disease. A gene drive spreads an edit through the wild population, but it can be designed to last only a set number of generations, with appropriate safety measures.

EXAMPLES

1. A one-letter edit to protect the northern quoll
Northern quolls, small carnivorous marsupials, die when they eat invasive cane toads and may go extinct within decades. Some mammals elsewhere tolerate the toad toxin thanks to a single amino-acid change in one gene. Colossal Australia partners made that change in quoll cells, and lab-dish tests suggest it could let quolls survive eating the toads.

2. Florida panther genetic rescue
By the 1990s inbred Florida panthers had crooked tails, cowlicks and undescended testicles. Texas panthers were brought in during the mid-1990s and the defects disappeared for a while. Now that the population is cut off again, inbreeding is returning, so the rescue has to be repeated.

3. Black-footed ferrets and Elizabeth Ann
Thought extinct, the species turned up when Shep, a family dog near Meeteetse, Wyoming, killed one; the taxidermist recognized it. Every ferret alive descends from a small captive group. In 2020 Elizabeth Ann was cloned from tissue frozen about 40 years earlier at the San Diego Frozen Zoo, to restore lost genetic diversity. She couldn't reproduce, but a later clone from the same line has had offspring.

4. Cloned red wolves
Alongside the dire wolves, Colossal announced cloned red wolves, North America's most endangered wolf. Princeton's Bridgett vonHoldt found coyote-like animals with more than 75% red wolf ancestry, which are being used to add genetic diversity to the small captive population in the Carolinas.

5. The American chestnut
A fungus brought in on imported Chinese chestnut trees killed about a billion American chestnuts in the early 20th century. Shapiro cites a gene-edited chestnut, which she calls the first organism engineered for conservation, being deregulated by the USDA.

OTHER RELEVANT

1. Judge projects by staged risk analysis
Shapiro argues every release or relocation should be staged and modeled for risks and rewards. Humans are already the stewards of ecosystems they have changed, and doing nothing is also a choice.

2. Read ancestry results with care
Neanderthal DNA isn't 'vigor genes.' Most segments are neutral, and the 2–5% differs from person to person.

3. Height and trait genes have deep histories
Many height-related variants came into Europe with Steppe (Yamnaya) migrants about 4,700 years ago. Northern European height has plateaued, which suggests a ceiling for the current gene pool.

4. Fear of new biotech tends to fade with familiarity
Shapiro notes the 'big fear wall' around new technologies often comes down once people encounter the results. She sees clear public communication as part of the scientific work.

What Humans, Animals and Plants Tell Us About Consciousness | Michael Pollan

Guest: Michael Pollan
Date: 2026-09-28 · Duration: 2:02:19
URL: https://www.youtube.com/watch?v=nk15CT41MFc

KEYPOINTS

1. Consciousness is easy to recognize but hard to define
Pollan starts from a few working definitions. One is simply subjective experience: a toaster has none, and he argues current AIs don't either. Another comes from philosopher Thomas Nagel's 1970s essay 'What Is It Like to Be a Bat?': if there is something it is like to be a creature, it is conscious. By that standard bats count, even though we can only roughly imagine navigating by sonar.

2. Humans long assumed they had a monopoly on consciousness
From Descartes onward, other animals were assumed not to be conscious. Pollan notes that the first mirror self-recognition test on chimpanzees was only around 1970, about 55 years ago, when scientists began accepting that other primates are conscious too. Building a universal standard around our own version of consciousness, he says, seems 'kind of crazy.'

3. Consciousness may start with feelings in the brainstem, not thoughts in the cortex
Pollan was persuaded by a line of work from Antonio Damasio in the 1990s and, more recently, South African psychiatrist and neuroscientist Mark Solms. Their view is that the brain exists to keep the body alive around homeostatic set points. The body reports on those set points through feelings like hunger, warmth, cold and itch, and consciousness arises from registering and acting on those feelings.

4. Most vagus-nerve traffic runs from body to brain
Pollan says about 80% of the information in the vagus nerve flows from the visceral organs up to the brain. Huberman, who teaches neuroanatomy, confirms the figure and puts the descending share at roughly 15–20%, though nobody knows exactly. They argue that we lack language for most bodily signals. Huberman suggests our current state may reflect body signals integrated over the previous ~10 hours.

5. Plants show problem-solving that looks like intelligence
Pollan distinguishes intelligence from consciousness but argues that plants handle novel problems, not just programmed reflexes. His examples are corn roots solving a maze and plants responding to the sound of feeding caterpillars. He doesn't think plants have the deliberate awareness that social life demands, but calls plant intelligence a fascinating field.

6. Awareness may exist because social life can't be pre-programmed
Most of what the brain does, like monitoring the body and adjusting to the environment, happens without awareness. The most persuasive explanation Pollan has heard, which he admits is an evolutionary 'just-so story,' is that human society is so complex that you can't automate every move. That requires theory of mind, imagination and deliberate choices.

7. Consciousness without a self is possible
Pollan points to the roughly 500 milliseconds after waking when you are reconstituting who and where you are. Huberman jokes it's 750 ms in a hotel room. That suggests consciousness doesn't have to be organized around a self, something Buddhists have long held. Pollan says psychedelics and experiences of awe also reduce the sense of ego, in a pro-social way.

8. Pollan keeps 'filter' theories of consciousness open
After surveying the theories, Pollan concludes we have no real idea how brain matter generates consciousness, if it does. Some argue the brain channels consciousness like a radio or TV receiver: you wouldn't look inside the set for the weather presenter. He doesn't endorse this view, or panpsychism, but no longer dismisses either.

9. Building a conscious AI would test the feelings theory
Some individuals and companies are trying to make AI conscious, not just intelligent, and those are different goals. If consciousness originates in feelings, it may depend on having a vulnerable body and perhaps mortality. Success or failure would both be informative.

10. Caffeine is a drug most of us are dependent on, and mostly a beneficial one
Roughly 90% of adults use caffeine daily, as coffee, tea or yerba mate. Pollan says it has many health benefits up to about seven or eight cups a day, after which problems begin, and some people get jittery on much less. He cites benefits for Parkinson's and blood pressure, plus polyphenols in coffee and tea that help the microbiome. These are his claims from researching the topic.

EXAMPLES

1. Awe shrinks the self, literally on paper
Pollan describes an experiment by Berkeley colleague Dacher Keltner. People drew a stick figure of themselves on graph paper, then had an experience of awe such as river rafting, then drew themselves again. The second figure was about a third the size, which Pollan reads as a healthy, pro-social reduction in ego.

2. Corn roots in a maze
Give a corn plant a maze with ammonium nitrate fertilizer in one corner, and its roots find the fastest path to it. Pollan stresses this isn't a situation the plant meets in nature, so it can't simply be programmed behavior.

3. Xenobots: behavior without genetic instructions
Tufts biologist Michael Levin takes skin cells from tadpoles and puts them in a solution, where they clump into a new

organism that lives about a week or two. These 'xenobots' repurpose their cilia to move, can be conditioned and can navigate mazes, though nothing in their genes encodes those instructions. Levin also argues that memory can be stored in bioelectric fields in groups of cells, not only in neurons.

4. Pollan's three-month caffeine fast

Roland Griffiths, the Johns Hopkins psychopharmacologist who launched the psilocybin research renaissance and earlier studied caffeine, told Pollan you can't understand a habitual drug until you get off it. Pollan had been drinking coffee since age 8–10 at breakfast with his often-absent father. Quitting cold turkey brought flu-like symptoms. Even after they eased, he didn't feel like himself for about three months. His first cup back was 'better than any psychedelic experience': he cleaned his closet and the garden. The second cup was less special.

5. Ibogaine's unusual path to approval

Pollan notes that ibogaine, the psychedelic nobody wants to use recreationally and one never put through university drug trials, looks set for approval first. He credits veterans' advocacy and says the push followed Joe Rogan texting the president. The same executive order is fast-tracking MDMA for trauma (Resilient, formerly Lykos, previously turned down and now resubmitted) and Compass Pathways' psilocybin. Pollan questions whether this is how drugs should be approved.

6. Two food chains

In a roughly 8,000-word New York Times piece that became a chapter of The Omnivore's Dilemma, Pollan followed one cow from insemination to slaughter. He contrasted an oil-based corn feedlot system, in which the corn makes animals sick and requires drugs, with a sunlight-and-grass chain. He insisted on including the hopeful alternative, grass-fed beef, which was then a tiny market, and later visited Joel Salatin's rotational grazing farm in Virginia.

OTHER RELEVANT

1. Try a caffeine break to learn your relationship with it

Following Griffiths' advice, a period fully off caffeine shows how dependent you are. Expect withdrawal symptoms for a few days and possibly feeling 'not yourself' for longer. Pollan frames drugs as neither good nor bad but dependent on context.

2. Seek awe deliberately

Awe can come from nature, rafting, music or psychedelics. Pollan presents its ego-shrinking effect as good for relationships and perspective, not just pleasant.

3. Treat the garden as a laboratory

Pollan argues that about 8% of US land is protected and the rest is either 'virgin' or exploited. Learning to work with nature where we live, as in a garden, teaches more than visiting wilderness.

Best Tools for Gut Health & Weight Loss | Dr. Chris Thompson

Guest: Dr. Chris Thompson
Date: 2026-09-21 · Duration: 2:27:53
URL: https://www.youtube.com/watch?v=ecjEM3NJ0lU

KEYPOINTS

1. Fiber is food for your microbes, and without it they start eating your gut lining.
Thompson explains that gut bacteria ferment fiber into butyrate, which helps maintain the tight junctions that seal the intestinal barrier. Starve them of fiber and they turn to the thin mucous layer protecting the gut wall, producing less butyrate and weakening the barrier further, a 'snowball effect' he links to inflammation and broader metabolic problems.

2. Roughly 35 g of fiber a day for men and 25 g for women is a sensible target, and quality matters.
Huberman cites these standard recommendations and Thompson agrees, adding that fiber type matters. Recent studies of resistant starch type 2 (such as raw powdered potato starch) improved fatty liver and insulin sensitivity. His bowel rule of thumb: more than three movements a day leans too loose; fewer than one every three days means you're bound up, and fiber is the first thing to examine.

3. Intermittent fasting is not a major gut-health concern in his view, and eating earlier may beat skipping breakfast.
Huberman relays a Yale microbiome researcher's view that the microbiome feeds on the gut lining during a fast but often rebounds to a slightly better state afterward. Thompson thinks the benefits generally win. Newer thinking suggests eating earlier and starting the fast in the afternoon may beat skipping breakfast, though he still skips it.

4. Stress can contribute to ulcers, but H. pylori and poor blood flow are major causes.
Barry Marshall proved H. pylori causes gastric ulcers by swallowing it himself. In gastric bypass patients, Thompson found many ulcers weren't bacterial: they came from reduced blood flow (worsened by type 2 diabetes and smoking) plus acid reaching bowel that lacks neutralizing pancreatic bicarbonate.

5. GLP-1 drugs work, but stopping and restarting them can leave your body composition worse than before.
With older drugs like semaglutide, about a third of weight lost is lean mass (mostly muscle, some bone). Regained weight returns as fat, so on-off cycling steadily worsens body composition. Thompson treats these as essentially lifelong medicines and says long-term effects of super-physiologic doses are unknown, though he believes benefits outweigh costs for obesity.

6. Rather than quitting a GLP-1, taper to the lowest dose that holds your weight.
His maintenance approach: reach the effective dose, lose the weight, then 'micro-dose' down to a level that holds it and feels good; not everyone finds that spot. About 30% of users stop in the first month and around 50% by year's end, similar to other chronic medications.

7. Fasting insulin is a cheap early warning sign that almost nobody checks.
Thompson describes metabolic decline as a predictable sequence: calorie excess (often glucose), chronically high insulin, then fat stored in the wrong places (ectopic fat in the liver and organs). Eating every few hours keeps insulin elevated because it stays high for hours after each spike. A continuous glucose monitor can flag foods that push you toward 200 mg/dL, and a fasting insulin test can catch the next stage years before diabetes.

8. Your body defends a weight range, which is why weight regain is so common.
Set point is really a defended range, governed partly by leptin from fat cells acting like a thermostat. After weight loss, muscles become about 25% more efficient at the same task and resting and daily energy expenditure fall. An NIH follow-up of Biggest Loser contestants found them burning about 500 fewer calories a day.

9. Resistance training is non-negotiable during weight loss, with zone 2 and HIIT alongside.
Thompson asks all patients to start resistance training, ideally before they begin losing weight or have a procedure, to protect lean mass. Zone 2 cardio favors fat burning. High-intensity intervals help mobilize visceral fat, which carries beta-adrenergic receptors that respond to acute stress. That fat is released during the effort but burned later, since the workout itself runs on glycogen.

EXAMPLES

1. Colon cancer screening from age 45
Thompson calls colon cancer one of the most common cancers he sees and says survival is improving thanks to screening. He recommends starting at 45. With a family history, start at 40, or 10 years younger than the relative's age at diagnosis. Options include colonoscopy every 10 years if normal, or stool DNA tests like Cologuard repeated every few years.

2. Ötzi the Iceman had H. pylori
The roughly 5,000-year-old man found frozen in the Italian Alps carried H. pylori. Thompson adds that industrialization has left us with far fewer microbial species and less microbiome diversity.

3. The Whitehall II study
This long-term study followed British civil servants and found that high fasting insulin predicted diabetes 10–15 years later. Thompson's point is that the problem could be caught and addressed a decade or more early, but fasting insulin is rarely measured.

4. A Gila monster led to GLP-1 drugs
In the 1990s in the Bronx, Dr. John Eng found a molecule in Gila monster venom (exendin-4) that closely resembles human GLP-1 but resists breakdown. It binds the same receptor and became the template for long-acting GLP-1 drugs.

5. A fistula repair that cured diabetes

Around 2003–2004 Thompson closed a small leak (fistula) in a gastric bypass patient to stop reflux. The patient unexpectedly lost weight and their diabetes resolved almost immediately. That puzzle drew him into gut hormone research and procedures designed to manipulate those hormones.

6. ESG plus ghrelin-cell ablation

Thompson developed endoscopic sleeve gastroplasty (ESG) in 2012. Through the mouth, the stomach is folded on itself to make a smaller pouch. Adding argon plasma ablation of the ghrelin-producing cells in the upper stomach (an idea from Germany) raises weight loss from about 18% to over 20%, possibly around 25%, at top centers.

OTHER RELEVANT

1. Don't panic over GLP-1 blindness headlines

Thompson says vision loss affects a very small group with a particular optic nerve structure that reduces blood flow. Screening for it makes sense, but GLP-1s are 'not making people go blind all over the place.' He also says reports of apathy are amplified on social media relative to the data.

2. Artificial sweeteners: better than high-fructose corn syrup

He sees little or no effect on insulin or resting glucose; Huberman notes data showing diet-soda drinkers lose more weight than water drinkers, while not encouraging diet soda. The bigger issue is that sweeteners usually come in highly processed foods. Thompson would treat high-fructose corn syrup 'like alcohol'; fructose in whole fruit is fine because its matrix slows delivery to the liver.

3. Seed oils and omega-3s

Polyunsaturated oils are generally fine unless oxidized or reused for deep frying. He doesn't worry about the omega-3:6 ratio; occasional fatty fish (he aims for a couple of times a week) covers omega-3 needs.

4. Leaky gut is real, but name it precisely

Increased gut permeability is '100% real.' Thompson says the term 'leaky gut' irritates doctors because its meaning is vague. Describing the specific symptoms and concerns helps when raising it with your physician.

The Art of True Happiness | Dr. Arthur Brooks

Guest: Arthur Brooks
Date: 2026-09-14 · Duration: 2:49:59
URL: https://www.youtube.com/watch?v=Gk2ArbsrZwE

KEYPOINTS

1. Happiness has three 'macronutrients': enjoyment, satisfaction and meaning
Brooks found that 'I know it when I feel it' wasn't a usable definition, so he borrowed nutrition's model. Looking at people with the highest well-measured life satisfaction, a factor analysis points to three building blocks. Enjoyment is pleasure made human. Satisfaction is the joy of an accomplishment after struggle. Meaning is the 'why' of your existence. A happy life needs all three.

2. Happiness and unhappiness are not opposites
Trying to eliminate all suffering, which many people do, paradoxically makes them miss their own happiness. 'Mother nature doesn't care if you're happy.' Negative emotions like sadness, anger, disgust and fear are an alarm system signaling threats. They're unpleasant but mean the system is working. What matters is how you respond.

3. Pleasure is not enjoyment
Pleasure is a limbic event: ventral striatum and VTA stimulation can come from a partner saying 'I love you' or from cocaine. 'The pursuit of pleasure is not the secret to happiness, it's the secret to rehab.' Enjoyment adds people and memory to a pleasure and puts the prefrontal cortex in charge, so you manage it rather than it managing you. Brooks's rule of thumb: if you're doing it alone, it's probably pleasure. He adds that solitary prayer walks don't count because they aren't addictive.

4. Every day is a choice between animal impulses and moral aspirations
The prefrontal cortex lets us override impulses wired in for a kin-based species living in bands of 30–50 hunter-gatherers 250,000 years ago. Brooks borrows Dante's pairing of the deadly sins with heavenly virtues, such as pride with humility and envy with admiration. The fix for a lapse isn't self-loathing but pivoting to 'the man I want to be.' For him, that means being in the gym by 4:45 a.m. instead of staying under the covers.

5. Satisfaction is proportional to struggle
The satisfaction from a PhD matches the suffering that went into it. Brooks uses a David Koch joke about getting rich: he doubled his money selling apples, then his father died and left him $100 million. It's funny because real satisfaction comes from the struggle, not the accolades. Strivers fail in the opposite direction too. They defer forever and never stop to eat the 'second marshmallow' they earned.

6. Retirement often wrecks satisfaction
'Work and work, be miserable, then stop completely at 65 and goof around' is, Brooks says, a recipe for misery all the way through. He prefers the Hindu life stages, each roughly 25 years: student (brahmacharya), householder (grihastha), then from about 50 vanaprastha, 'retiring into the forest.' That means stepping back from the scoreboard and honors, not from work or relationships, as training for the final stage of sannyasa, focused on the transcendent.

7. Know your idol, because it costs you love
Following Thomas Aquinas, Brooks names four worldly idols: money, power, pleasure and honor or fame. None is bad in itself; money creates jobs and philanthropy, and pleasure leads to babies. Chasing them as ends becomes the source of later bitterness and regret, because the price is almost always love. They also keep you on the hedonic treadmill, since emotions reset almost immediately.

8. 'Proper leisure' earns you no worldly reward
Leisure counts as proper when it doesn't pay off in money, power, pleasure or honor. Brooks names three forms: deepening relationships on purpose, learning something you don't need to learn, and developing yourself metaphysically, whether spiritually, religiously or philosophically, for transcendence alone.

9. Meaning is today's biggest happiness crisis
Brooks argues, using a simplified left-brain/right-brain framing, that meaning needs the integrated brain that connects 'how and what' to 'why.' He says the average person checking their phone 205 times a day, fed an endless algorithm, stays stuck on the 'how' side, where meaning is absent.

10. For faith, start with practice, not feelings
People expect feeling, then belief, then practice. Brooks says it runs the other way: practice, then belief, then occasionally feeling. You stay married because you practice marriage, and the same holds for a relationship with God. He calls doubt and gradual exploration normal and says wanting the divine is, in the classical argument, a sign of its object, though not proof.

EXAMPLES

1. The unhappy billionaire
While interviewing wealthy financiers for From Strength to Strength, Brooks met a famous billionaire who told him she was 'so unhappy.' She and her husband were roommates, her adult children merely cordial, and her employees afraid of her. She kept drinking despite her doctor's advice and missed the church she loved as a girl. To Brooks it was the classic picture of chasing idols at the cost of love.

2. Brooks's own daily protocol
At 62, Brooks wakes at 4:30, is in the gym by 4:45 for about an hour seven days a week on a four-day push–pull–legs–yoga cycle, and has trained almost daily for 30 years. He still wants to throw up on leg day. When home, roughly four days a week, he attends 6:30 a.m. Mass with his wife. He says he's on the road 48 weeks a year.

3. His father's 90-minute lecture

Brooks watched his father, a math professor and biostatistician, give a 90-minute advanced calculus lecture with no notes. Asked how, his father said he'd done it hundreds of times. Brooks uses it as a model of mastery through repetition and admiration as a virtue.

4. A mentor's prediction about pay

Asking for a $20,000 raise early in his career, Brooks was told he'd earn far less than he deserved early on and far more later. He says it proved exactly right, and he was happy living lean and snowboarding once a month in grad school.

5. Suffering in two languages

Brooks has been married 35 years in a 50/50 Spanish–English marriage, so 'we can suffer in two languages.' He argues that couples should expect to suffer together. Wedding vows ('richer and poorer, sickness and health') are a public promise to stick it out through hard times.

OTHER RELEVANT

1. Audit your three macronutrients

Ask whether you have real enjoyment (social, remembered, managed), satisfaction (earned through struggle, then actually savored) and meaning. Most strivers neglect enjoyment and never stop to collect the reward.

2. Break the tech cycle in three windows

Brooks's simple protocol is no devices in the first hour of the day, the last hour of the day, or at meals. He ties these to morning mental programming, sleep and relationship quality, and the bonding chemistry of eating together.

3. Ask the three 'whys' of meaning

Why do I think things happen the way they do, and am I acting accordingly? Why am I doing what I do? Is it to chase an idol like money, control or adoration, and does that fit my beliefs? Why does my life matter, and to whom? He says answering honestly is the point.

4. Make public commitments

Declaring a moral aspiration publicly, as in vows or adult baptism, helps you hold to it when animal impulses pull the other way.

How Mitochondria Control Your Metabolism | Dr. Jared Rutter

Guest: Dr. Jared Rutter
Date: 2026-09-07 · Duration: 2:03:46
URL: https://www.youtube.com/watch?v=bv56Cuq-fyY

KEYPOINTS

1. Your metabolism is the sum of roughly 30 trillion separate cell-level metabolisms.

Rutter (University of Utah, HHMI) argues that 'calories in, calories out' hides what matters: each cell type runs its own metabolic program suited to its job. A heart muscle cell, a fat cell, a neuron and a gut stem cell take the same fuels and do very different things with them, so health and disease are best understood one cell type at a time.

2. Mitochondria do far more than make energy; they also decide how much fuel goes into building new cell material.

The 'powerhouse of the cell' label is incomplete. Mitochondria burn fuel with oxygen to make ATP, the cell's energy currency, but they also supply the building blocks (biomass) a cell needs to grow and divide. Rutter's central theme is this resource-allocation decision between burning fuel and building with it, which happens in every cell all the time.

3. Pyruvate is the fork in the road between energy and growth.

Glucose is broken down to pyruvate. Pyruvate can either be carried into mitochondria and fully burned for ATP, which heart cells 'love to do', or be diverted along with other glycolysis intermediates into making new cellular material, which is what the intestinal stem cells that rebuild your gut lining every 5–7 days do.

4. Rutter's lab helped identify the mitochondrial pyruvate carrier (MPC1 and MPC2), the gate that lets pyruvate into mitochondria.

Scientists knew for 60–70 years that such a carrier had to exist, but not what it was. Working from mitochondrial proteins of unknown function, his lab and fly geneticist Carl Thummel's lab found the two proteins around 2008–2012, publishing in 2012 at the same time as Jean-Claude Martinou's lab in Geneva. Everything that has mitochondria has MPC1 and MPC2.

5. Cells set their energy split by sensing and feedback, not a fixed ratio.

Asked whether heart cells always devote something like 90% of fuel to ATP and 10% to upkeep, Rutter said it is 'definitely not programmed' like a valve with a fixed split. Cells measure their outputs and adjust, an 'adaptive logic' that responds to what the cell and the body need at the moment.

6. Hormones carry information about which fuels are available, and cells respond in their own ways.

Insulin (and GLP-1) signals 'I just ate', so cells take up and store or use glucose. Glucagon, a fasting hormone now being combined into some newer GLP-1 drugs, does the opposite: it tells fat cells to release stored fat so the heart and other tissues can burn it.

7. Fuel use follows a rough priority order, and excess fatty acids get burned early because they are acutely toxic.

Rutter says there is definitely prioritization, though no strict rules. Excess free fatty acids can be toxic quickly, while high glucose is harmful more chronically. The heart eats a 'dog's breakfast' of fuels (fats, glucose and lactate) so it can keep beating in any metabolic state.

8. Lactate is a real fuel, not just a waste product.

When muscle runs short of oxygen during hard exercise, pyruvate can't be burned and is converted to lactate. Lactate was long seen as waste. Rutter cites work over the last 5–10 years from Princeton's Joshua Rabinowitz showing lactate is an important fuel in its own right that tissues like the heart readily burn and that moves energy around the body.

9. Cancer cells' mitochondria aren't broken; they are redirected toward building.

In the 1920s Otto Warburg saw that cancer cells use less oxygen than expected and concluded broken mitochondria cause cancer, a view that lasted decades. Rutter says the low oxygen use is real (the Warburg effect), but tumor mitochondria are 'very, very good' at making the material a dividing cell needs rather than burning fuel.

10. Overloaded mitochondria are a leading suspect in damage from excess energy and in aging.

A widely accepted but not universal hypothesis holds that when mitochondria are overpowered by too much incoming energy, they produce reactive oxygen species that damage DNA and proteins and cause mutations. Rutter adds that mitochondria become less energized and effective with age almost universally, and that damage building up over time correlates strongly with aging, though the causes are 'largely unclear'.

EXAMPLES

1. Mice lacking the pyruvate carrier don't survive.

With knockout technology (developed by Utah Nobel laureate Mario Capecchi), mice missing MPC develop for about 12–13 days, roughly two-thirds of the way to birth, and then die. Flies lacking MPC live but show specific defects, which helped reveal that pyruvate entry into mitochondria was blocked.

2. Deleting MPC only in the heart leads to heart failure from a growth decision, not an energy shortage.

In work started by Ahmad Cluntun, a former Rutter postdoc now running a lab at Rutgers, mice with heart-specific MPC loss live for weeks, then die with massively enlarged hearts. They can still make ATP by burning fat. Rutter speculates (his word) that the cells divert glucose into growth, and enlarged heart cells create the same dilated, weak-pumping heart seen in most human heart failure.

3. One cell can contain two kinds of mitochondria.

Recent work from Craig Thompson at Memorial Sloan Kettering showed that a single cell can contain distinct mitochondria. In simplified terms, one kind is more biosynthetic (building) and the other more focused on extracting energy and making ATP.

4. Mitochondrial DNA comes entirely from your mother.

Mitochondria came from a bacterium that entered an ancestral cell, and they keep their own genome. At fertilization only the sperm's nucleus enters the egg, not its cytoplasm, so all mitochondrial DNA is inherited from the egg. This has implications for how mitochondrial diseases are inherited.

5. Cancer is better classified by mutation and metabolism than by organ.

Rutter notes that some breast cancers resemble certain liver cancers more than other breast cancers, because the old system grew out of where surgeons removed tumors. Huberman cites David Fajgenbaum's nonprofit Every Cure, which tests already-approved drugs on individual patients' tumor cells. Rutter adds that a drug killing 99.9% of tumor cells can still fail because the surviving 0.1% regrow the tumor, which argues for combination therapies.

OTHER RELEVANT

1. Don't treat 'boosting metabolism' as one dial.

Since each tissue allocates fuel differently, the same intervention can push energy toward burning in one cell type and toward growth in another. Rutter frames future therapies as targeting energy allocation in specific cells, such as the pyruvate fork, rather than whole-body metabolism.

2. Excess energy has costs beyond body fat.

Huberman and Rutter agree that chronically taking in too much energy can create downstream biochemical stress, from mitochondrial overload and reactive oxygen species to the acute toxicity of excess fatty acids. This is an argument for avoiding chronic overnutrition. No specific diet or supplement protocol is offered.

3. Watch for cell-level metabolic imaging.

Rutter is excited about new tools that measure specific molecules at individual locations inside single cells, mostly in mice and cultured cells for now. Huberman imagines a future body scan showing how each organ's cells split energy between upkeep and growth across a lifetime, which Rutter treats as plausible but not available today.

4. Treat 'smelling disease' as intriguing, not diagnostic.

Huberman raises cancer-sniffing dogs and a woman reported to smell Parkinson's. Rutter finds it plausible, since scents are chemistry, but it is poorly understood, correlational and no frontline test.

How to Accelerate Learning & Improve Education | Joe Liemandt

Guest: Joe Liemandt
Date: 2026-08-31 · Duration: 2:33:43
URL: https://www.youtube.com/watch?v=Uzoe1RYVjiA

KEYPOINTS

1. Schools gave universal access; the next goal is universal learning
The K–12 classroom model came from Prussia about 100 years ago, when society first set out to educate everyone. Around 30 students per teacher was what that goal could afford. Liemandt, principal of Alpha School, argues that kids now have access, but how much they learn over 12 years varies hugely. He believes AI makes it possible, for the first time in 50–100 years, to redesign how learning happens.

2. One-on-one tutoring to mastery is the gold standard
He cites Benjamin Bloom's 1980s 'two sigma' paper: individually tutored students who learned to mastery performed about two standard deviations higher, roughly top 2%. Parents' fixation on class size, he says, is really a proxy for getting closer to one-on-one. The part people forget is mastery, not just the tutor.

3. Alpha's model: about two hours of AI-guided academics, then life skills
Students do roughly two hours a day of individualized lessons, and Liemandt says they learn about twice as fast as peers. He stresses this isn't a chatbot. Dropped into a normal school, he says, chatbots get used to cheat by about 90% of kids. Afternoons go to workshops on building, sports, entrepreneurship and public speaking, led by adult 'guides' rather than academic teachers. He says 100,000 people applied for those roles last year.

4. Mastery has three layers
First, can you solve a problem at all? Second, true mastery means doing 10 hard problems, not three easy ones. Third, can you still do them a month or two later? That calls for spaced repetition rather than cramming. American schools, he says, move kids along with an 80% 'B,' leaving holes. His analogy is a basketball coach who wouldn't practice dunks with a team losing the ball 20% of the time; 85% isn't acceptable.

5. Fluency frees working memory
We have only a few working-memory slots. If you know 7 × 8 = 56 cold, it costs nothing; if you have to calculate it, it uses up slots needed for a multi-step algebra word problem. So, he says, kids who struggle in algebra usually have a third-grade math-facts problem, not an algebra problem. Gifted kids, who have the most slots, often skip writing down their work and hit this wall later.

6. Material must sit at the right level
What you know is the base for what you can learn. Give someone material that's too hard, like an MCAT to a non-biologist, and no amount of 'grit' or 'growth mindset' helps. You have to roll them back to where they actually are and build up. AI can generate the exact missing lessons and set an individual pace.

7. Measure growth rate, not achievement, and remove the blocks
Alpha benchmarks each student against peers at the same percentile. Its claim is that top-1% students learn twice as much in two hours as other top-1% students learn in a full day, which Liemandt says rules out a simple rich-kid selection effect. Guides' daily job is to find each child's mental block, such as middle-school girls convinced 'I'm not good at math,' and remove it.

8. Paying kids can work, he argues
Liemandt says paying for mastery doesn't destroy motivation in their experience, though he acknowledges the self-determination-theory debate. Alpha pays students $1,000 to reach the top 1%. Against roughly $20,000 per pupil per year in public school, or about $240,000 over K–12, he calls small cash incentives cheap. Public schools are legally barred from paying students cash.

9. In traditional schools, family income predicts scores best
He says the top predictor of test scores is family income, with IQ secondary. Then come IQ and Big Five conscientiousness: natural 'grinders' who do every problem in the book are running a mastery system on themselves. Smart kids without that trait struggle in time-based schools.

10. Kids want high standards and hard things
Liemandt says high standards are key to a child's happiness, not a source of stress. Over 90% of Alpha students say they love school, and 40–60% said they'd rather go to school than on vacation, depending on the vacation. In the past year, 85% of parents said they had seen their child do something they thought was impossible for that age.

EXAMPLES

1. The 710 SAT student and her multiplication tables
A girl stuck in the low 700s on the math SAT kept being told her errors were careless. The real cause was that she hadn't memorized her math facts. Persuading a 710 scorer, and her parents, that the fix was a third-grade lesson took a lot of motivational work from the guides.

2. '100 for 100'
Seventh graders had gaps from earlier grades, and their parents refused to send them back to fourth-grade material. Liemandt went straight to the kids and offered $100 for a 100 on the state test at any grade level, starting with third grade. They earned $100 on the third- and fourth-grade tests, scored 85 on fifth, asked the AI for the missed lessons, finished them that week, and kept climbing to seventh.

3. Kindergarten feats

Alpha kindergarteners climb a 40-foot rock wall. At the San Francisco campus, kids learned to ride a bike and then rode 5 miles across the Golden Gate Bridge without stopping.

4. A 40-step special-effects glass lab

Science labs train two skills: how many steps you can follow in a row, and your margin of error. Making safe stunt glass is about a 40-step process with little room for error. Kids who start at 1 p.m. expecting to finish by the end of school are still at it at 6 p.m. and refusing to go home. Liemandt pairs 11 minutes of app-based mastery with 45 minutes of hands-on experiment.

5. Texas Sports Academy demand

Texas vouchers, for kids with a learning disability or families under $65,000 income, had $1 billion allocated and ran out. Within 100 days of vouchers opening on January 1, over 120,000 Texas families had signed up saying they wanted a voucher for Alpha's sports-academy model, which costs less than $20,000 a child.

6. How Liemandt came to Alpha

Founded 12 years ago by Mackenzie and Brian, Alpha first looked to him like a 'janky' school, with no teacher at the front and girls reciting vocabulary while doing handstands. One daughter was struggling in Catholic school. She tried a week at Alpha in summer, when her school was out, and wanted to stay. He's now in his fifth year as principal.

OTHER RELEVANT

1. Fix foundations before advancing

If a child is stuck, look for gaps a grade level or more back, such as math facts to fluency, instead of more practice at the current level.

2. Use AI as a tutor, not an answer engine

Structured, mastery-gated lessons help. Open chatbots in a standard classroom mostly enable cheating, by Liemandt's estimate.

3. Test retention, not cramming

Revisit material a month or two later. Spaced repetition is what turns 'solved it once' into real mastery.

4. Make kids build things

Liemandt argues that drones, robots, businesses, books, videos and sports are what engage kids, a return to the old idea of shop class. He says MIT's Blueprint Labs will run randomized trials to test whether the model works, and where it doesn't.

How to Improve Motivation & Overcome Procrastination | Dr. Masud Husain

Guest: Dr. Masud Husain
Date: 2026-08-24 · Duration: 2:20:21
URL: https://www.youtube.com/watch?v=58-k4F7-AoA

KEYPOINTS

1. Motivation has a specific biology, and when it breaks you get apathy, which is different from depression.
Husain, an Oxford professor of neurology and cognitive neuroscience, says he once thought of motivation as personality, until a patient about 15 years ago showed him otherwise. Apathy is a loss of drive to act, and an antidepressant did nothing for that patient. Depression and apathy can overlap, but they are not the same thing.

2. The brain constantly weighs effort against reward, and apathetic people need a bigger reward to act.
Husain frames every choice as a cost-benefit calculation: is this reward worth this much effort? In his experiments, apathetic people and patients still worked for high rewards but refused low-reward options that motivated people accepted. Their problem is a raised threshold, not an inability to want things.

3. The basal ganglia link motivation to action.
These deep brain structures, especially the ventral striatum and nucleus accumbens, date back to the lamprey, roughly 360 million years old. In such animals they connect drives like hunger or sex to the actions that satisfy them. Damage here can cut the link between wanting and doing.

4. For some people, simply deciding costs extra brain energy, which Husain calls an activation-energy barrier.
When people had to decide whether a reward was worth an effort, the ventral striatum and medial frontal cortex lit up. Unexpectedly, these regions were more active in apathetic students than motivated ones. Husain reads this as apathetic people burning more brain fuel just to make the same decision, so at home they may skip the decision altogether.

5. Two levers raise motivation: lower the effort or change the reward.
You can break a task into smaller parts so the first step seems less formidable, or reframe the incentive so it feels novel, social or meaningful. Husain says this simple principle may be enough for many people to work out what to change.

6. Planning ahead cuts the cost of decisions you'd otherwise make on the fly.
Since every decision costs effort, making them one by one through the day can feel burdensome. Planning the day or week in one sitting may lower total activation energy for some people, though Husain notes it suits some people better than others.

7. Dopamine drives the vigor of action, not just pleasure.
Researchers increasingly see Parkinson's slowness (bradykinesia) as partly a loss of motivation to act, not purely a motor problem. Husain also notes dopamine supports working memory and executive control, citing Patricia Goldman-Rakic's classic work. He resists the popular 'dopamine hit' framing of everyday activities.

8. Stimulants follow an inverted-U curve: they may help low performers and can make high performers worse.
Husain reads the psychopharmacology literature as showing only small boosts for people starting from a low baseline. Already-high performers risk getting worse, so he tells his university students to think twice about stimulants for grades. Huberman raises escalating nicotine-pouch use, from one pouch to a canister a day, as likely just maintaining baseline rather than boosting cognition.

9. Having Alzheimer's pathology does not guarantee dementia, and lifestyle and psychological factors shape resilience.
Plaques and tangles start building up 10–15 years before symptoms. Husain lists exercise, controlled blood pressure and cholesterol, avoiding diabetes, limiting alcohol and not smoking. He adds that purpose, social connection and curiosity matter almost as much: people who keep or grow their social networks, stay open to new pursuits, or wake with a sense of purpose show lower dementia risk across studies, after adjusting for confounders.

10. Attention may not be trainable in general, but you can stop degrading it.
Husain says there is little evidence you can intrinsically train attention. The brain has limited capacity, so external stimuli and internal chatter compete for selection. What you can do is remove distractions.

EXAMPLES

1. 'David', the financier who stopped caring.
A highly social finance worker in his 30s suddenly became apathetic, lost his job, couldn't be bothered to claim benefits, and sat in a chair all day while friends cooked and prompted him to shower. He wouldn't listen to music because setting up the speakers took 5 minutes. MRI showed two tiny strokes in the basal ganglia.

2. Levodopa failed but ropinirole worked.
Husain's team first slowly increased levodopa, the drug from Oliver Sacks' Awakenings, with no change. They switched to ropinirole, which directly stimulates dopamine D2/D3 receptors. Three months later David arrived showered, with a haircut and suit, a new job and a new girlfriend, so changed that Husain didn't recognize him in the waiting room.

3. The Parkinson's patient in a burning house.
The classic clinical observation is that a Parkinson's patient who barely moves can run out of a house they realize is on fire. Husain's reading is that the motivation signal surges enough to engage the action system.

4. Rewards speed up eye movements in Parkinson's, and dopamine boosts them further.
With colleague Sanjay Manohar, Husain showed that offering more reward for fast eye movements raised eye-movement speed in Parkinson's patients, as in healthy people, and adding dopamine medication raised it further. Incentive and

dopamine together increase vigor.

5. The 'teach me' trick.

Huberman describes a social-media parody skit: a man gaming ignores his partner's request to hang pictures, but leaps up when she asks him to show her how. Husain says the incentive changed from a chore to the reward of teaching, dropping the barrier to near zero.

6. WWII radar operators and the vigilance decrement.

British studies of radar operators watching dull screens for German aircraft showed that sustained attention fades over time even in healthy brains. In ADHD, a key signature is more variable responses over time, which Husain suspects might improve if motivation for the task were higher.

OTHER RELEVANT

1. Lower the first step.

For a task you keep avoiding, shrink it into subcomponents or attach a different reward, such as novelty, teaching someone or a social payoff, rather than relying on willpower.

2. Cut distractors at the source.

Husain's practical tools: turn off notifications, close email while you're doing focused work, and reduce distracting noise in your environment.

3. Build 'chop wood, carry water' effort.

Huberman argues you find your passion by getting good at effort in things you aren't passionate about, rather than waiting for passion to pull you, as David's case showed. Doing some mildly disliked but harmless tasks builds that capacity.

4. Be cautious with stimulants and nicotine.

If you're already performing well, the inverted-U suggests stimulants for study may backfire, and responses vary between individuals. Talk to a doctor, and don't assume more is better.

5. Protect cognition with both the physical and social basics.

Manage blood pressure, blood sugar, cholesterol, alcohol and smoking, and keep relationships, curiosity and purpose, especially around retirement, when colleagues and roles fall away.

Neuroscience of Emotions & Tools for Improving Emotion Regulation | Dr. Ralph Adolphs

Guest: Dr. Ralph Adolphs
Date: 2026-08-17 · Duration: 2:09:30
URL: https://www.youtube.com/watch?v=P-h5WSQG1Sw

KEYPOINTS

1. Emotions are functional brain states defined by features like priority, valence, scalability and persistence.
Adolphs, a Caltech professor of psychology, neuroscience and biology, admits theories (Joseph LeDoux, Lisa Feldman Barrett, Paul Ekman) look so different that philosopher Paul Griffiths once argued emotions don't exist as one category. His working view is a package of features. Priority means emotions interrupt whatever you're doing, an idea Nobel laureate Herbert Simon described decades ago. Valence (positive versus negative) may not be strictly required.

2. Emotions scale and persist; reflexes don't.
A reflex is all-or-nothing, like the knee-jerk. Fear scales with how close the threat is, from anxious monitoring of a distant bear to fleeing to panic, and emotions outlast their trigger. These two features come from David Anderson's mouse hypothalamus work. Sadness, Adolphs notes, has one of the longest time constants.

3. You can study emotions without solving consciousness.
Adolphs separates emotion states from the conscious feeling of them, just as vision and memory are studied in animals like horseshoe crabs with no claims about awareness. That lets researchers study emotion in animals by its functional features rather than by asking about subjective experience.

4. Emotions are essential for decision-making.
Citing Antonio Damasio's 1994 book Descartes' Error (Adolphs was then a postdoc with Damasio in Iowa), he notes that people with large frontal-lobe lesions who no longer respond emotionally can't make complex life decisions or organize their lives, because no option feels better than another.

5. Regulation starts with emotional granularity: noticing and naming your emotions precisely.
This idea, which Adolphs credits mainly to Lisa Feldman Barrett, means how finely you can perceive your own states. Once you're aware of an emotion you can apply strategies, mostly cognitive reappraisal (reinterpreting the situation). Huberman notes that real feelings are often a mix, such as confusion plus frustration, which makes naming them hard.

6. The earlier you intervene in an emotion, the better, and both strategy and automaticity are trainable.
Adolphs's first line is situational avoidance: structure your life so you don't land in situations that trigger the emotion you want to avoid. Once you're in one, what works is fairly individual. Two things can be trained: reappraising without overthinking, which can deepen the emotion, and the strength and automaticity of control, so regulation becomes smooth and effortless.

7. We're far worse at reading emotions from faces than we think.
Dog owners are convinced they can tell when their dog feels guilty, but in controlled tests they perform at chance. Adolphs says our confidence 'vastly outstrips our accuracy'. The posed, static Ekman photos used in labs (he used them in his own 1994 Nature paper) aren't what we see in life. Real faces are dynamic, and in practice we ask questions and use context.

8. Where you 'feel' an emotion in your body reflects concepts, not measured physiology.
The well-known body-map figure came from a PNAS paper by Lauri Nummenmaa and colleagues in Finland. Participants were shown a single word and drew where they thought they'd feel it; nothing in the body was measured. Adolphs stresses brain and body are tightly coupled, and work by Feldman Barrett and Tor Wager shows reliable but distributed brain signatures for basic emotions.

9. Autism involves effortful, rather than automatic, social processing.
In Adolphs's webcam eye-tracking studies, people watch Zoom-style videos, and those scoring higher on autistic traits or with a diagnosis make less eye contact, a pattern stable from month to month. He argues the core difficulty is cognitive load: consciously tracking eye contact, turn-taking and the rest is overwhelming when it isn't automatic.

EXAMPLES

1. Amnesic patients stay sad without knowing why.
Patients with severe anterograde amnesia and controls watched sad film clips. Five minutes later, controls said they still felt a bit sad because of the movie. The amnesic patients felt 'really sad' but couldn't remember any movie. This shows emotional persistence is separate from declarative memory.

2. A woman without an amygdala feels no fear of threats, but CO2 triggers panic.
A patient with amygdala lesions poked monsters in a haunted house and wanted to handle snakes and spiders in a pet store. Yet in a study led by Justin Feinstein, with René Hurlemann in Germany, she and similar patients had full-blown panic attacks when inhaling carbon dioxide, which causes panic in about half of people. Internal suffocation alarms run through brainstem circuits rather than the amygdala.

3. Adolphs's ice-bath experiment of one.
Prompted by Feinstein, he started ice baths in an insulated horse trough, buying 40 lb ice bags weekly. The first week was 'terrible, super painful', with breathing and heart rate shooting up. Now his heart rate and breathing drop as he gets in. He reports that his anger at drivers honking behind him in Pasadena has gone 'flat', which he offers as personal, unpublished evidence that trained calm generalizes.

4. Three to five minutes of silence before lab meetings.

Since 2020 (started in memory of George Floyd), his Monday-noon lab meetings open with laptops and phones down and a few minutes of meditative silence, sometimes with a photo of a Kauai landscape on screen. New summer students find it stressful at first.

5. Ultramarathon training through illness.

Adolphs is training for a 100-mile race while dealing with a health condition whose therapy causes joint pain and fatigue. He describes the 'relentless forward momentum' and relentless optimism of ultra culture, and says facing illness has brought gratitude, awe and sharper choices about how to spend his time.

OTHER RELEVANT

1. Build granularity before reappraisal.

Practice distinguishing what you feel, such as frustration versus confusion versus anxiety, then reinterpret the situation. Keep reappraisal brief so it doesn't become rumination.

2. Use deliberate stressors to train automatic calm.

Cold exposure or short meditation can act as reliable, repeatable training in staying calm. Adolphs likens a brief meditation to an ice bath because both are uncomfortable at first. They mention a study, connected to Richie Davidson's meditation research, in which 5 minutes of daily meditation initially raised anxiety. Both treat the generalization to everyday stress as plausible but anecdotal.

3. Don't over-trust a facial read.

Before concluding someone is sad or angry, ask questions and take in the context. A grimace might just be a bad-tasting drink.

4. Create quiet input-free time.

Adolphs, who has no social media, argues that running, meditation or ice baths provide internal processing time that a constant stream of inputs crowds out.

Using AI to Increase Your Intelligence & Enrich Humanity | Dr. Fei-Fei Li

Guest: Dr. Fei-Fei Li
Date: 2026-08-10 · Duration: 2:08:13
URL: https://www.youtube.com/watch?v=N5AQFYtqx8Q

KEYPOINTS

1. Vision is a cornerstone of intelligence, in both evolution and AI.
Li notes that animals first 'saw light' about 540 million years ago (trilobites and their relatives). Within roughly 10 million years came the Cambrian explosion, as sensing drove active hunting, mate-seeking and rapid speciation. Today an estimated half of human cortical activity is involved in vision, and children are visual before they are verbal. Computer vision likewise sparked the modern AI moment.

2. Modern AI came from three things converging around 2012: neural networks, big data and GPUs.
Simple neuron-like algorithms date to the 1950s: units that take an input, apply a simple function and pass an output on, stacked into networks. By around 2010 the algorithms had matured, GPUs made massively parallel computing possible, and the internet supplied data. Li's key insight was that big data had to drive these algorithms, which led to ImageNet.

3. The same recipe, a better algorithm plus more data plus more compute, produced ChatGPT.
The transformer paper (around 2016–2017) proved more powerful than the earlier AlexNet-style networks, and this time natural language processing made the leap, using the internet's text. It still took about five years, from 2017 to 2022, to reach the 'ChatGPT moment.' From about 2023, teams added video to training data, leading to text-to-video tools like Sora.

4. AI is bounded by what humans have captured; uncaptured, personal thought stays uniquely human.
Li argues that a deeply personal thought or feeling (the emotion behind a piece of abstract art, say) was never recorded, so it isn't on the internet and AI hasn't seen it. Neuroscience can't even say which brain area such a thought comes from. AI deserves credit for combining information creatively, but that combining is a different thing from human experience.

5. AI 'creativity' is real but special, and it thrives where the rules are clear.
AlphaGo's famous Move 37 is often cited as machine creativity, but Li stresses that Go has clear mathematical objectives and rules. Greater compute and memory let AI explore moves human brains don't typically consider. She calls that creativity, but 'a special kind.'

6. Context in a prompt is not intuition, but it changes the answer.
Asked whether AI could ever have intuition about something like a sibling relationship, Li separates intuition from creativity. Telling a chatbot 'I'm a Stanford professor and neuroscientist' versus 'I'm a 14-year-old who loves race cars' gives it context, which already reshapes the response. She tries to describe a scientific process for how any such capability could arise rather than treating it as mystical.

7. AI should augment human agency, never take it away.
Li says agency, motivation and dignity matter at every individual level, and AI leaders should not talk as if the technology will strip people of them. She criticizes experts who talk down to the public and decide for them. People deserve education on the pros and cons, and the choice. She left Google to co-found Stanford's Human-Centered AI Institute in 2018, before ChatGPT, because she saw these societal questions coming.

8. For kids, the worst outcome is AI killing the motivation to learn, and banning it is also bad.
Li's pessimistic scenario: doom-scrolling and passive shorts erode agency, when real learning 'takes time, takes effort, sometimes takes some pain' for a brain that must go through developmental phases. The opposite danger is denying students the tools out of fear of cheating. With motivation intact, AI can take learning deeper, and she predicts such a generation would be 'way smarter than us.'

9. Technology limits are social choices, not just technical ones.
Li's example: any carmaker could program brakes to fail every Friday, a trivial piece of technology, but laws, norms and morality stop it. AI likewise has to move from purely technical discussion into social and legal discussion, even amid pressure from the 'AI race' to go faster.

10. The next frontier is spatial and physical intelligence beyond language.
Humans develop preverbally first, and evolution ran about 500 million years without language. Li's company, World Labs, builds foundation models that generate 3D and 4D worlds for creators, robot training, architecture, healthcare and education. She sees robotics, or 'embodied AI', as the step after language models.

EXAMPLES

1. ImageNet and its challenge
Li's lab assembled ImageNet, about 15 million images of everyday objects and the first internet-scale AI dataset. From 2010 it ran a public challenge: name the main object in an image across 1,000 categories, using a test set of more than a million images. A Stanford graduate student benchmarked human error at a few percent. In 2012 neural networks, ImageNet and GPUs together cut machine error into the teens, the turning point of modern AI.

2. Learning 'cat' from a glimpse of a tail
Huberman uses a child learning 'kitty cat' to frame object constancy, recognizing a cat from the side, the back or just its tail. Li explains that generations of computer scientists tried to hand-code this before data-driven learning finally made it reliable.

3. Eddie Chang's speech neuroprosthetics
Huberman describes neurosurgery chair Dr. Eddie Chang (his childhood friend) decoding neural activity for the larynx and pharynx so paralyzed, locked-in patients can speak, one for the first time in 10 years. One woman, who uses a wheelchair,

speaks through an iPad avatar built from her wedding video, voice and movement patterns. Li calls this embodiment.

4. The action potential paper nobody wanted to deal with

Huberman recalls a Nature paper from about 12 years earlier showing that action potential shapes vary within a neuron, which contradicts textbooks. Scientists largely ignored it because it broke the rules. His point is that AI given the right rules could handle such complexity better than experts trained on fixed rules.

5. Exhausted nurses and isolated elders

After a month in hospital with her father, Li describes nurses walking miles per shift to fetch supplies and medicine, and elderly people living alone who struggle to get groceries or go for a walk. These are the jobs she sees robots helping with, amid a caretaker shortage.

OTHER RELEVANT

1. Learn to prompt the Socratic way

Li calls prompting a real skill she'd like taught in K–12 schools. Her answer to 'who is humanity's best prompter?' is Socrates, because his method sought truth by asking questions. She also says AI has stopped her from asking 'lazy questions' of colleagues.

2. Use AI as a tutor when you're stuck

Recalling how hard organic chemistry was in premed, with too few TA and office hours, Li says an AI companion would have let her ask endless questions about exactly where she was stuck. The motivation has to come from you; the tool supplies guidance.

3. Consumer versus creator mode

Huberman approaches AI as a consumer when he knows nothing about a topic and as a creator when he already has knowledge to build on. Both note that brain plasticity continues throughout life, so adults can learn these tools too.

4. Don't forget teachers and parents

Li is optimistic about curious kids. She worries about teachers and some parents, whom Silicon Valley and policymakers rarely consult, and she makes a point of talking with them wherever she goes.

How Your Immune System Works & How to Improve It | Dr. Max Krummel

Guest: Max Krummel
Date: 2026-08-03 · Duration: 2:27:41
URL: https://www.youtube.com/watch?v=s_tkMm5U9aY

KEYPOINTS

1. The immune system's core job is telling self from non-self
Krummel retells a 1970s immunologist's analogy. WWII submarines carried two books of engine sounds, one for friendly subs (don't fire) and one for enemy subs. The immune system works the same way, and Krummel says the self/non-self question has turned out far richer than immunologists thought in the 1990s and 2000s. He calls today's view a 'new immunity.' It isn't a single fuel gauge running low for self and high for viruses.

2. Your body becomes a genetic mosaic as you age
Skin cells may pick up roughly 10,000–30,000 DNA mutations per cell per day from basic sun exposure, more than many other organs, which is one reason for sunscreen. Over years, neighboring cells stop being identical. Part of the immune system's role is surveillance: checking that cells are still 'the right thing' and acting when something is out of range, as with emerging cancers.

3. Kids get sick often because everything is new to them
A child's body has never seen flu or most other pathogens, so nearly every virus causes some illness. But young immune systems react strongly and clear infections quickly. Some childhood vaccines aren't given until about six months or later for developmental reasons. In late life, susceptibility rises again.

4. The thymus trains T cells, then shrinks
T cells are named for the thymus, where developing cells with an enormous range of possible receptors, on the order of 10^11, are screened. Cells too reactive to your own tissues, which might attack your pancreas or 'your big toe,' are weeded out to maintain tolerance. With age the thymus involutes and becomes tiny in older people, so it stops putting out new T cells. That's why there's interest in revitalizing it, for example to supply fresh tumor-specific T cells in cancer.

5. Unapproved thymic peptides are hype for now
Huberman notes that some people are already injecting non-FDA-approved thymus-derived peptides and says he doesn't recommend it. Krummel's general warning is that an idea that makes intuitive sense often fails. If an experiment has a 10% chance of working, you need at least ten tries, and probably more, to expect a result. Self-experimenters also generate anecdotes that get mistaken for data.

6. Sleep loss likely hurts immunity partly through 'plumbing'
Bags under the eyes and glassy eyes after poor sleep are well-established lymph-clearance problems that resolve after a night or two of good sleep. Krummel doesn't think lymph alone explains why one bad night makes you catch a cold, though. His speculative model is that cleanup processes, like macrophages clearing debris in the eye, work best when you aren't generating new metabolic 'grime.' It's like washing a windshield when you're not driving into flies.

7. The brain can store and replay immune states
In a mouse study Krummel describes, inflammatory bowel injury was induced with a sugar that damages the gut. Neurons firing in the insular cortex during that period were tagged. Re-activating those neurons after recovery made the gut immune system set itself up again as if newly injured. The implication is that memories, and possibly cues like smells, carry immune states. Krummel says it makes the idea that meditation can shift you toward less inflammatory states 'less and less wacky,' while warning that intuitive stories can mislead.

8. Acute stress helps immunity; chronic stress harms it
Huberman argues, and Krummel agrees, that the immune-enhancing effects of acute cortisol and stress have been overlooked next to the well-known harms of chronically high cortisol.

9. Some autoimmunity may be a trade-off
Genes that make the immune system overactive may persist because they help during pandemics. Huberman raises reports that mild psoriasis, which involves interleukin-17 and responds to anti-IL-17 drugs, may come with better resistance to infection. They present this as an intriguing reason why autoimmunity might be adaptive, not settled fact.

EXAMPLES

1. Jacques Miller's thymus experiment
Children who had the thymus removed during exploratory heart surgery often died later of opportunistic infections. Jacques Miller, then in England, removed the thymus from newborn mice. They grew up okay but succumbed to bacterial infections, and a few developed tumors, a cancer link noted then forgotten. Krummel thinks the discovery deserved a Nobel Prize.

2. Krummel's own vaccine choices
He vaccinated his kids, calling it a reasonable 'no-brainer' after weighing the risks and benefits. He also asked to go off the standard schedule at one point. His reasoning is that schedules are often built on a single study plus convenience, and his mouse work shows slightly different timing can still give the same protection.

3. Why no test predicts checkpoint-drug response
In melanoma, checkpoint drugs cure about 50% of patients, up from essentially zero before. But since nobody can tell in advance who will respond, everyone takes them. A predictive test would cut the drug's market in half, so companies have no incentive to build one.

4. Cord-blood banking: unproven value

Huberman asks whether anyone is alive today because they banked umbilical cord blood. Krummel says he doesn't know. Banked stem cells can in principle rebuild blood after the bone marrow is wiped out by radiation, as works in mice. He suggests thymic-cell banking is also speculative.

5. 'I've already successfully reproduced'

Huberman recalls collaborator David Feldheim, of UC Santa Cruz, handling carbocyanine dyes without gloves years ago. When asked about gloves, Feldheim quipped that he had already reproduced. They use the story to discuss the 'grandparent effect': genes favoring older people may persist because elders help raise and teach the young.

OTHER RELEVANT

1. Prioritize sleep when exposure is high

After one bad night, the coworker coughing across the room is more likely to get you sick. A couple of good nights clears the visible lymph backlog and, by both speakers' experience, restores resilience.

2. Use acute stressors, but avoid chronic stress

Short stress spikes appear immune-boosting, while sustained high cortisol impairs immunity.

3. Be skeptical of immune hacks

Peptides, thymic banking and other self-experiments may work, but most plausible ideas fail. Wait for real data rather than internet anecdotes.

4. Talk with your doctor about vaccine timing

Krummel supports vaccination and notes that schedules have some flexibility. Discuss any change from the standard schedule with your doctor rather than skipping vaccines.

Accelerate Learning & Increase Cognitive Capacity | Dr. Tommy Wood

Guest: Dr. Tommy Wood
Date: 2026-07-20 · Duration: 2:41:26
URL: https://www.youtube.com/watch?v=bPd9NnOzx78

KEYPOINTS

1. Protecting the aging brain takes three things together
Based on population studies and trials in older adults, Wood's framework is to exercise, keep doing the things you already know how to do, and keep learning new things you can't yet do. 'Use it or lose it' is true, but novelty and being bad at something are what push the brain to change.

2. Adults lose function partly because they stop doing hard, new things
In a paper with a colleague, Wood argued that cognitive decline partly comes from no longer giving the brain new, complex inputs, because 'adults hate being bad at things.' The discomfort of mistakes is part of learning. A beginners' class where everyone fails together makes it easier and more fun.

3. Pick skills that combine movement and thinking
Pick something well outside your current skills that has both motor and cognitive parts, such as dance, sports, music or other arts. Narrow brain-game practice mostly makes you better at that game. Broader, more human skills engage many brain networks and probably carry over further into daily life.

4. Processing-speed training has the best long-term evidence among brain games
The ACTIVE trial in the 1990s, the largest pure brain-training trial in people in their 60s and 70s, tested memory, reasoning and visual processing-speed training. Speed training flashes items for shorter and shorter times, down to hundreds of milliseconds. A recent secondary analysis found that speed training with booster sessions at one and three years was linked to significantly lower dementia risk 20 years later. The US POINTER trial used BrainHQ, built on Michael Merzenich's work, alongside diet, exercise and cardiovascular-risk management.

5. Deep focused work tops out at about 60–90 minutes per session
In the classic violinist practice study behind the '10,000 hours' idea, top players typically practiced in two sessions of 60–90 minutes a day. Wood suggests that pattern as a rule of thumb for work that pushes past your current skill. Huberman adds that marathon days of 6–12 hours led to a drop in output afterward.

6. Eat enough, but not too much, and cover key nutrients
Studies of the Bolivian Tsimane (hunter-gatherers), the Moseten and industrialized populations found a bell-shaped curve between energy availability and brain volume. The nutrients with the best evidence for cognition and dementia risk are vitamin D, iron, omega-3s, and the methylation B vitamins (B12 and folate, possibly B6 and riboflavin). Polyphenols from berries, coffee, tea and chocolate, plus carotenoids such as lutein, zeaxanthin and astaxanthin, have decent support.

7. Nutrients work together, which explains many 'failed' supplement trials
In the Oxford VITACOG trial, later replicated in B-PROOF, B vitamins lowered homocysteine but brought no benefit when omega-3 levels were poor. In OmegAD, omega-3s didn't help people whose homocysteine was high. Wood's point is that trials that don't first check what participants lack shouldn't be expected to show effects.

8. Stimulants set the stage for learning but don't cause it
Huberman and Wood agree there's no 'plasticity pill.' Caffeine and other stimulants raise arousal and focus, which learning needs, so any benefit is likely indirect. For peptides and newer compounds, Wood personally wants documented safety first and a specific problem to solve. Often all that exists is an absence of reported harms over short periods of use.

9. Fitness intensity matters for the hippocampus
In one trial, older adults were randomized to low-intensity exercise, Zone 2 treadmill work three times a week, or the Norwegian 4x4 interval protocol three times a week for six months. The 4x4 means 4 minutes at 85–95% of max heart rate, 3 minutes of rest, repeated four times. Fitness gains were similar in the Zone 2 and interval groups, but the interval group showed better hippocampal function and better-preserved hippocampal structure on MRI. Separately, 6–12 months of basic machine resistance training changed white-matter structure and improved executive function.

10. Training volume can steal mental energy
A flat-out 2K row, about 6 minutes at maximal effort, leaves the brain useless afterward. Huberman does low-volume, high-intensity lifting: about two sets per exercise and two to three exercises per muscle group. Adding a third set leaves him dragging for the rest of the day. Leaving something in the tank on volume, though not within each set, helps when hard thinking comes next.

11. Most dementia risk factors can be changed
The Lancet Commission on dementia prevention, led by Gill Livingston, lists 14 modifiable risk factors that together account for about 45% of cases. They include low early-life education, high blood pressure, diabetes, hearing loss, vision loss, brain injury, high LDL cholesterol and physical inactivity. APOE is the most common risk gene, but late-onset Alzheimer's is driven mainly by lifestyle and environment.

EXAMPLES

1. Shingles vaccine natural experiments
In Wales, Australia and Canada, eligibility for the shingles vaccine began on a specific birth date, so people born a day apart were compared. Those eligible or vaccinated consistently had lower dementia risk, while other diseases and vaccine uptake didn't differ. These studies used the older live vaccine Zostavax. A US study looked at the newer recombinant Shingrix, and a

fully powered trial is being planned.

2. Illness causes stepwise drops in cognition

In the Adult Changes in Thought study (University of Washington) and Rush Memory and Aging Project, cognition didn't decline steadily. It dropped in steps after major illness, with bigger drops after hospitalization, so avoiding serious illness protects the brain.

3. MIND diet vs. calorie restriction

In a New England Journal of Medicine trial, the MIND diet and standard calorie restriction gave similar benefits. Wood suspects that's because many people live in chronic energy excess. A UK Biobank analysis found that removing any single Mediterranean-diet food, olive oil included, didn't change the diet's link with lower dementia risk. He reads that as nutrient-dense whole foods mattering more than any one item.

4. Creatine after concussion

The best trial, in children and teens aged 1–18, used 0.4 g per kg per day, which would be about 28 g for a 70 kg adult. Wood says recent meta-analyses find GI side effects rarely exceed placebo, and poor-quality products may cause many complaints. Huberman recalls the 1990s loading protocol of 5 g four times a day in grape juice.

5. Branched-chain amino acids for brain injury

Studies gave up to 60 g of branched-chain amino acids daily. In one veterans study, Wood recalls three 20 g doses spread across the day, far above the typical 3–5 g gym dose.

OTHER RELEVANT

1. Practical learning schedule

Do one or two focused blocks of 60–90 minutes with short breaks, on something just beyond your skill. Expect some discomfort and mistakes.

2. After a concussion

Wood's early steps: avoid alcohol and caffeine, partly to protect sleep, and consider creatine, which has some reasonable evidence. Physical therapy and other supports come later. Get medical guidance for any brain injury.

3. Test before supplementing

Check vitamin D, iron, B12, folate, homocysteine and omega-3 index. Wood doesn't know whether pushing an omega-3 index from about 7–8 up to 12 helps further.

4. Don't fear cortisol from training

Cortisol naturally swings 20–30 fold from morning to night. Short spikes from hard workouts or cold showers are not Cushing's syndrome, which involves pathologically high cortisol.

How to Improve Your Memory & Cognitive Function at Any Age | Dr. Alan Castel

Guest: Dr. Alan Castel
Date: 2026-07-13 · Duration: 2:28:39
URL: https://www.youtube.com/watch?v=EIhilBpn8Ow

KEYPOINTS

1. Memory is reconstructive, and we misjudge how well we know things
Castel, a UCLA memory researcher, notes that two people can see the same event and remember it differently a day later. Awareness of your own thinking (metacognition) is often poor: we feel we know something we don't. As a child he rehearsed a single line in The Wizard of Oz ('there's a cyclone on the way, hurry and get into the cellar') and on opening night swapped 'cyclone' and 'cellar.'

2. Seeing something often doesn't mean you remember it
People have seen the Apple logo thousands of times but can't say which side the bite is on or whether it has a stem or a leaf, an update of the classic penny study. Drawing it while looking helps. Better still is struggling to draw it from memory first and then checking. Making mistakes before seeing the answer produces stronger learning than simply studying.

3. Desirable difficulties beat easy studying
Castel cites work by his UCLA colleagues on 'desirable difficulties': learning that feels uncomfortable often sticks better, even though teachers and students tend to make it easier. Students who highlight 80% of a textbook and still get a C show the real skill is picking out what matters and organizing it around themes, such as findings that make intuitive sense versus counterintuitive ones.

4. Name tricks are workarounds, and forgetting names is normal
Mnemonics like 'Castel rhymes with pastel' require extra effort and cause predictable errors ('Pastel'). Names get harder with age because there are more Davids and Andrews competing in memory. Using the name several times and practicing recall help. Castel argues that remembering what you talked about, or whether you can trust someone, matters more.

5. Confidence is not accuracy, as eyewitness cases show
In the Ronald Cotton case, a woman who was assaulted deliberately studied her attacker's face so she could identify him. She confidently picked Cotton, and he was convicted. Decades later DNA evidence exonerated him. Factors included cross-race identification, which is less reliable, and the way an identification can overwrite the original memory. Castel says memory should be treated as one source of evidence that can be contaminated, like DNA.

6. Under stress we fall back on habit, so rehearse plans ahead of time
Castel walks to the fire exits when he checks into a hotel, after guests once asked him which way to go during an alarm. Under high arousal people default to what they already know. Prospective memory, remembering to do something in the future, is especially prone to failure when attention wanders, as when you suddenly realize you've driven home on autopilot.

7. Walking can enlarge the hippocampus
The hippocampus, key for remembering facts and events, shrinks about 1–2% a year in later life. In a randomized trial, older adults who walked three to four times a week for 40 minutes grew hippocampal volume by about 1% compared with a stretching group, and their memory was better a year later. Castel sees exercise as a stronger memory tool than any pill.

8. Brain pathology doesn't fully determine behavior
In the Nun Study, some nuns whose brains showed Alzheimer's plaques and tangles after death had functioned well cognitively in life. Castel suggests purpose, social connection, exercise and sleep may help explain the gap. The amygdala, which tags memories with emotion, stays active with age, which is one reason embarrassing mistakes stick so well.

EXAMPLES

1. Taking 'mental photographs'
Huberman describes deliberately 'snapshotting' moments, such as a picnic with his first girlfriend, which now stays somewhat blurry. Castel says research on photographic memory shows that even people with exceptional visual memory make errors. Choosing to mark a moment as special, especially one with emotional weight, is what helps it stick, and those memories can still drift in their details.

2. The one-leg balance test
One in four people over 65 will fall, and a fall can lead to bed rest and less walking, which shrinks the hippocampus. Castel's quick check is to stand on one leg for at least 10 seconds, holding on to something if needed. Most people never test their balance.

3. Subjective age predicts longevity
After 40, most people feel about 20% younger than their actual age, and how old you feel predicts lifespan better than chronological age. People with positive attitudes toward aging live longer and are less likely to develop dementia. Pessimism about aging in general paired with a sense of control over your own aging is also linked to longer life.

4. SuperAgers and the anterior midcingulate cortex
Huberman notes that in SuperAgers the anterior midcingulate cortex keeps or gains volume. When Josef Parvizi stimulated this area in patients, they described a sense of challenge and the will to push through it.

5. AI voice-clone scams
Scammers use voices taken from social media to fake a grandchild calling for help. These scams exploit socioemotional selectivity, older adults' focus on family and feelings, and AI makes them harder to spot.

OTHER RELEVANT

1. Castel's ABCs of successful aging

Partly inspired by his conversation with UCLA coach John Wooden, whose two takeaways were love and balance: A is attitude and adapting to changes, B is balance (SuperAgers are rarely extremists) and C is connection with the people and activities you love.

2. Be selective as you age

Under Laura Carstensen's socioemotional selectivity theory, people focus on what matters most as their time horizon shrinks. Selective optimization with compensation means keeping the one hike you love rather than doing everything. Castel's research finds older adults focus more selectively on what's important to them, and they also show a positivity bias.

3. Maintain and learn new things

Castel's father, in his 80s and 90s, still plays the piano pieces he knows. Castel recommends a mix of keeping existing skills and taking on new ones that sit just beyond your current skill.

Movement Practice to Strengthen Your Mind-Body Connection | Ido Portal

Guest: Ido Portal
Date: 2026-06-29 · Duration: 2:59:48
URL: https://www.youtube.com/watch?v=Zz8chJwh3S4

KEYPOINTS

1. Discipline and motivation are scaffolding, not will itself
Portal argues that we often substitute discipline or motivation for real will, which he finds elusive and largely unstudied. Discipline matters, and people should build it first, but he compares it to the wall in handstand training. If you keep pushing off the wall, you become dependent on it. Used well, discipline gets you started, and then you add playfulness, relaxation and a sense that you are genuinely choosing to do the thing.

2. Play keeps you from going rigid when things get hard
Portal says he brings playfulness to almost everything, including some of his best meditation sessions, because it stops him from tensing up against a challenge. He also points to awe, curiosity and other strong aesthetic experiences, which he says are missing from modern life, as ways to loosen emotional patterns that have become rigid.

3. The transitions between sleep and waking are worth exploring
Through meditation and body practices, Portal can slow down the drift into sleep and pause anywhere along it. He thinks the period just before sleep, and waking in the night, can help reset over-simplified mental models. He even suggests that 'sometimes there is more to be gained with a bad night's sleep than with a good one'. Huberman connects this to yoga nidra, where he can feel himself falling asleep and catch himself.

4. Short, repeated practices beat occasional intense ones
Long retreats 'load the trampoline', but they can create dependence and don't easily carry over into daily life. Portal aims to practice all day and leans on brief practices repeated often, warning that people who chase intense one-off experiences don't necessarily change.

5. Granularity, or 'bodily resolution', fades unless you challenge it
Portal deliberately sets this apart from mobility or flexibility. He means fine-grained detail in how you sense and control your body. Without novelty and attention, the body's internal map simplifies and hardens. The same applies to emotional, social, conceptual and spatial models. He contrasts gym-goers who have lost something with a kung fu master walking 'with the gait of a child' at 5 a.m. in Beijing. Depression, he notes, flattens emotion into black and white.

6. Anxiety is being overwhelmed by unfiltered input
Huberman cites Richie Davidson's finding that new meditators show a statistically significant rise in anxiety at first, which he frames as stress inoculation. Portal describes anxiety as failing to filter what comes in, so 'everything bombards you' and drains resources. That, he says, is why long-term anxiety often turns into depression. Shrinking tasks into micro-tasks is one remedy, whether the practice is sitting, tennis balls or a stick.

7. Stop treating movement as a 30-minute exercise slot
Asked about busy people with only 30 minutes for cardio and lifting, Portal pushes back: 'What do you do with the rest of your time?' He wants people to pay attention to movement and presence while cooking, listening or working, not just to tick off workout boxes.

8. Feed your emotions and mind deliberately
Portal treats emotional and intellectual life like digestion that needs nutrients. On his list are discomfort, mixed feelings ('I love you and I hate you', which he points out in boxing), strong aesthetic experiences such as awe or melancholy, and restraint. Huberman adds Karl Deisseroth's nightly practice of forcing himself to think in complete sentences.

EXAMPLES

1. Exploring the pause between breaths
Huberman describes a meditation from psychiatrist Dr. K: focus on the pause between inhale and exhale rather than the breath itself. Portal links it to kumbhaka, or breath retention, and says that the closer you look, the more you find there's no exact point where the pendulum changes direction. He applies the same close observation to a strong urge to urinate, to goosebumps and to push-ups, which can be felt as a push or as a pull.

2. Finding warmth inside the cold
During an hour of standing meditation in cold, shallow water in Australia as the sun went down, Portal stayed with the cold until he found warmth underneath it. The cold vanished, and he learned to switch between the two, like an optical illusion that flips between two images.

3. Mating and aggression circuits in the brain
Huberman cites Dayu Lin's work with David Anderson showing that neighboring groups of neurons in the ventromedial hypothalamus drive mating or attack. Driving one suppresses the other, which then rebounds. He uses it to support Portal's view that perception is a push and pull between opposites.

4. Hearing multiple rhythms in fighting
Portal trains fighters to hear overlapping rhythms in footwork, breathing and even blinking. 'If you can't hear the various rhythms, you're not the DJ, and the DJ controls the party. You're going to get knocked out.'

5. 'Air sense' in acrobats and skateboarders
From his capoeira and acrobatics background, Portal notes that some well-coordinated people get lost once airborne. Trampolines and foam pits let skateboarders and bikers develop a feel for when to open up or change shape. Huberman cites

vert skaters Tom Schaar and Jimmy Wilkins as examples.

OTHER RELEVANT

1. Hold a problem in mind as a practice

Walk around keeping a single problem in mind. The only failure is noticing you've drifted and not coming back to it.

2. Pause before resisting a distraction

When social media 'calls your name', notice the pull and let yourself soften before returning to the task, rather than forcing yourself back. Portal says that over millions of repetitions the outcome is very different. Huberman, who calls feeds a 'wheel of infinite stimuli', used to hand his phone to his students during grant-writing days.

3. Use the night for difficult emotions

Mourning his graduate adviser, Huberman tried setting an alarm for 3–4 a.m. to grieve while half-awake. He found the grief more intense at that hour. Portal also suggests deliberately practicing remorse, as part of facing what you would change.

Science of Attraction, Compatibility & Romance | Dr. Paul Eastwick

Guest: Dr. Paul Eastwick
Date: 2026-06-22 · Duration: 2:50:15
URL: https://www.youtube.com/watch?v=CV0GtUlJ6NM

KEYPOINTS

1. 'Mate value' markets describe first meetings well and ongoing relationships poorly
Eastwick, a psychology professor at UC Davis, agrees that marketplace thinking fits initial attraction among strangers, where everyone notices the same surface traits. As people spend time together, those market forces weaken. Attractiveness never stops mattering entirely, but it matters much less once people actually know each other.

2. Dating apps are among the most unequal 'markets' there are
Right swipes and messages pile up on a small group of the most popular profiles, a skew Eastwick likens to a kleptocracy. Regular acquaintance is far less extreme. Because app companies care about engagement and probably need to recruit women onto male-heavy platforms, he doubts their incentives line up with users forming relationships. Matchmaking firms, which need happy dates, are more willing to share data with researchers.

3. People disagree about who is attractive more than you might think
When two people make quick 'hot or not' judgments about someone they have briefly met, they agree only about two-thirds of the time. That disagreement levels the playing field: different people pursue different partners instead of everyone chasing the same few.

4. Attraction usually starts middling and builds through shared moments
The typical first impression in relationships that last is 'fine', not fireworks. Attraction accumulates as you collect moments in which this particular person seems funny, smart, a good listener or hot to you, often things others never get to see. Reciprocal support during a unique shared experience is a common origin of attraction, even if it sounds less exciting than a spark.

5. Copying other people's preferences is a junior-high strategy
'Mate choice copying' means using who everyone else likes as a signal. Eastwick and Huberman see maturity as trusting your own subjective experience of a real person: 'she's hot but I'm not feeling it', or 'he looks unsettled, but I see a spark'.

6. Men and women want the same traits in people they actually meet
On questionnaires, men say attractiveness matters more and women say earning potential matters more. In speed dating, men liked ambitious women slightly more, and women liked ambitious men slightly more by an identical amount. Across roughly 20 years of work and 40-plus countries, those gender differences largely disappear when people evaluate real, met partners rather than profiles.

7. Both sexes prefer slightly younger partners when it comes to second dates
In matchmaking data covering about 4,000 people, where men in the pool averaged about four years older than the women, men were a bit more interested in younger dates. So were women, even though many had told matchmakers not to set them up with younger men. The effect was small in both cases.

8. Men are consistently the more eager partner
Recent reviews find a medium-sized, consistent difference: men want the relationship more, say 'I love you' first, push for exclusivity sooner and think more about exes after a breakup. Women more often initiate breakups. Eastwick's explanation is that many men lack the social-support networks women have, so they lean harder on a partner.

9. Happy partners automatically downgrade tempting alternatives, but fantasies can rebound
Satisfied partners rate alternatives as less desirable than they are ('derogation of alternatives'), which Eastwick calls a protective mechanism. Casual messaging with others can still escalate, so it is 'playing with fire'. Yet in studies where people fantasize about someone other than their partner, desire for the partner also rises, which echoes Esther Perel's view.

10. Feeling your partner is a good lover is among the strongest predictors of relationship satisfaction
The subjective sense that a partner is, or would be, a good lover tracks how positively people feel about the relationship overall and whether they want it to continue. Eastwick warns against fatalism: desire waxes and wanes with kids and stress and can be rekindled. Years of no desire, however, also erode self-worth.

EXAMPLES

1. The forehead-number class demo
Students are randomly given a number they cannot see and told to pair up with the highest-value partner they can. Those who draw low numbers panic because nobody will talk to them, which mirrors how strangers at a party or on an app internalize 'mate value'.

2. Women out-earning men no longer predicts divorce
Marriages used to be more fragile when the wife earned more, but that stopped being true in the 1990s. Objective income has only very small effects on how partners feel about each other; whether a couple has enough resources to get by matters more.

3. UC Davis department couples
Huberman recalls that more than 80% of junior-faculty couples he knew in one department later divorced, mostly on good terms. He offers this as an anecdote, not data, and uses it to argue that workplaces rarely nurture relationships the way churches, hiking clubs or other long-running small groups can.

4. Say Anything as a model first date

The couple goes to a party together and watches each other move through different groups rather than interviewing each other the way app dates do. Activity and group settings show how someone treats other people, including how protective, responsible and kind they are.

OTHER RELEVANT

1. Be around the same people repeatedly

Eastwick's default advice to singles is to join recurring, mixed groups such as kickball teams, hiking clubs or a church. These let attraction build over repeated encounters and come with a community that reinforces a couple over time, much as public wedding vows do.

2. Ask what someone's money actually means

Where wealth came from and how much free time comes with it matter more than the income figure. Cutthroat ambition that sounds great in the abstract can mean a partner or co-parent who is never around.

3. Keep a 'social support bank account', especially if you are a man

What protects health is the felt sense that people outside your partner would be there if you needed them, even if you never draw on it. Activity-based friendships can provide that.

4. Treat past relationships as having been real, not as failures

Eastwick encourages holding the value of an ended relationship or divorce alongside its problems. Huberman describes a rule with his partner: never speak negatively about exes, and practice some deliberate 'selective ignorance' about the past.

The Mental Frame & Specific Daily Actions to Succeed | Andy Stumpf

Guest: Andy Stumpf
Date: 2026-06-15 · Duration: 2:55:11
URL: https://www.youtube.com/watch?v=baecUt1GaPk

KEYPOINTS

1. Separate what concerns you from what you can influence
Stumpf, a former Navy SEAL and author of 'Drownproof', stresses that the tool isn't his invention. Your sphere of concern is the size of a table, while your sphere of influence is a pin drop. Draw a line down a sheet of paper and list everything occupying your mind on one side and what you can directly influence on the other. The influence column almost always comes down to yourself: your thoughts, self-talk, plans and use of time. Being worried about something doesn't change the outcome, but everything in the influence column does.

2. Use it on sticky early-morning thoughts
Stumpf now does the exercise about once a month to once every six months, usually when he wakes up with something stuck in his head. Nearly every time, the thought is in the 'concern' column. Seeing that helps him spot unhealthy attachments and return to what he can act on. Huberman says he has done it weekly since reading the book and credits it with more agency, including being on time 'for the first time in my life'.

3. Ask whether the platform works for you or you work for it
Stumpf and a fellow SEAL measured about 4.5 hours of daily phone screen time and challenged each other to get under an hour. Stumpf reached about 30 minutes, largely by moving tasks to his laptop, where Instagram is clunky enough that he posts and leaves, and his mental health improved. Both drifted back within a couple of months. That shows how 'sticky' phones are, even for people trained in extreme discipline.

4. Dunning-Kruger is what kills people in high-risk sports
Stumpf flew wingsuits and BASE jumped, learning at Idaho's Perrine Bridge, the one U.S. spot where it's legal year-round. He is blunt that the wingsuit BASE fatality rate is high. The most dangerous moment is surviving a hard jump and concluding 'nailed it' when you really just got away with it. A helicopter instructor once told him, 'Once you know better, you can do better.' He worries less about the sport's veterans than about people rushing their progression.

5. He didn't do it for the adrenaline
Stumpf says the appeal wasn't the rush. It was the narrowing of focus, like the minute before a helicopter landed on a combat objective, when rent, arguments and missed holidays disappeared and only the next three seconds existed. Leaving the military took that away, and 'the static of everyday life' became overwhelming.

6. Flow leaves a long, calm afterglow
After a stretch of jumping, Stumpf felt about three months of clearer thinking and less trivial stress. Huberman links this to Rick Rubin's description of a post-album peace. Huberman theorizes that flow may recalibrate time perception and lower your sensitivity to petty stressors, freeing up insight. He cites lab work showing that rising stress erodes the ability to make connected insights. Stumpf says art, yoga, ice baths, sauna and especially jiu-jitsu can provide it too.

7. Always take the slightly harder option
Every decision has a slightly easier and a slightly harder choice, and Stumpf says to pick the harder one more often. 'It always takes longer to do it wrong': shortcuts like 'I'll do it later' compound. He cites Admiral McRaven's make-your-bed speech as a small act of discipline you can stack. The most squared-away operators he knew were tidy by will, not by temperament. In training, the procedure, done even when you're exhausted, is what saves lives.

8. Micro-discipline matters most on days you don't want it
The tired days are the important ones: 'It's like this toilet paper roll weighs 2,000 lb.' Even if you do less, the mental victory of doing it when you didn't want to is what accumulates over a lifetime. What looks like macro discipline from outside is many small things nobody sees.

9. Many veterans brought trauma in with them
Talking about suicide among SEALs and other special operators, Stumpf notes that in his informal conversations, more than half the men he served with carried significant trauma from before the military. Leaving adds isolation, a move away from their social circle, loss of identity and purpose, and often alcohol. He describes suicide as arriving at an irrational decision that feels like the only rational one. He mentions psychedelic programs such as ibogaine treatment in Mexico without claiming they are a cure.

EXAMPLES

1. The toilet paper roll
Before the interview, Stumpf found three rolls in his daughter's bathroom: two empty and wedged to the side, and one stood upright. He closed the door and walked away. That became the episode's shorthand for small undone tasks and the slightly harder choice.

2. The anterior mid-cingulate cortex
Huberman describes Stanford neurosurgeon Josef Parvizi's stimulation of this region: patients report feeling 'a storm coming' and a will to push through it. The structure grows when people do things they don't want to do, such as successful dieting, and it is larger in 'super-agers'. Huberman's point is that it has to be something you don't want to do. Hard workouts you love may not count.

3. Shot in Baghdad, and morphine didn't work

Stumpf has a genetic quirk that makes opiates ineffective for him. He learned this after being shot, when morphine reached the maximum dose for his body weight with no relief and Dilaudid barely helped. Years later he underplayed severe abdominal pain, ending up upside down in a car seat thinking it was gas, until his wife drove him to the hospital.

4. Divorce as the hardest thing

Stumpf calls his divorce 'soul-crushing'. He says he used every tool in his book to get through it: circle of influence, breaking time into the shortest possible chunks, and controlling self-talk. To people who hear bad things about him, he says to believe it if they want, or come spend time with him and compare.

OTHER RELEVANT

1. Do the influence/concern page

One sheet of paper, two columns, as often as you need. Act only on the right-hand column, and notice how much mental energy the left-hand column consumes.

2. Make phones harder to use

Move social media to a laptop, set a daily cap, and pair up with a partner for accountability. Expect to backslide, and re-run the challenge when you do.

3. Define 'enough' before chasing a goal

Both agree that money buffers stress rather than buying happiness. Stumpf suggests defining your 'enough' plus a buffer. He would rather people fall a little short of a lifetime goal while staying fulfilled than sacrifice family, holidays and relationships and end up with 'everything they wanted and nothing'.

Eating for Better Sleep & Foods that Improve Metabolic Health | Dr. Marie-Pierre St-Onge

Guest: Dr. Marie-Pierre St-Onge
Date: 2026-06-08 · Duration: 1:57:05
URL: https://www.youtube.com/watch?v=jjaFnKtytqI

KEYPOINTS

1. Sleep and diet affect each other in both directions.
St-Onge came to sleep research from obesity research, where population studies kept linking short sleep to higher body mass index (BMI) and more weight gain over time. Her lab tests causality both ways: how sleep loss changes eating, and how what you eat changes that night's sleep.

2. Short sleep raises appetite through different hormones in men and women.
In her inpatient study, short sleep increased ghrelin, the hormone that drives hunger, in men. In women it lowered GLP-1, a fullness hormone. Either way, participants ate about 300 more calories a day when they could choose their own food, and brain imaging showed reward centers responding more strongly to food after sleep restriction.

3. Even mild, sustained sleep loss harms blood sugar control and blood pressure.
In a free-living study of women, cutting sleep by about an hour and a half (from roughly 7.5 hours to around 6, close to a full sleep cycle) for 6 weeks increased insulin resistance and raised blood pressure. Insulin sensitivity fell more in postmenopausal than premenopausal women.

4. Sleep loss burns a few extra calories, nowhere near enough to cover the extra eating.
In a small metabolic-chamber study of women at Columbia, energy expenditure rose about 5%, roughly 90 calories, under sleep restriction, against the ~300 extra calories eaten. She also thinks sleep-deprived people become more sedentary, with less spontaneous daytime activity. Eating may also be a subconscious way to get a jolt of energy when tired.

5. What you eat during the day changes deep sleep that night.
Using nightly sleep lab recordings (polysomnography), her lab found that more fiber was associated with more deep (slow-wave) sleep, more saturated fat with less deep sleep, and more refined carbohydrates and simple sugars with more arousals during the night. When participants switched from a controlled diet to choosing their own food, they ate about 450 more calories and 33% more saturated fat. They took over 70% longer to fall asleep and had about 20% less deep sleep.

6. Mediterranean and DASH-style diets are linked to less insomnia.
With Susan Redline in the MESA cohort, diets closer to Mediterranean were associated with a better chance of adequate sleep and fewer insomnia symptoms. In Women's Health Initiative data, women whose diets aligned with Mediterranean or DASH (Dietary Approaches to Stop Hypertension: fruits, vegetables, nuts and more) were less likely to have insomnia three years later. These are observational links, not proof of cause.

7. Eating later in the day reduces fat burning, even with identical food.
In a metabolic-chamber study, participants ate the same foods in the same amounts with a 10-hour eating window, starting either 1 hour or 5 hours after waking. Meals eaten later led to less fat oxidation. Huberman summarizes the takeaway as shifting meals into roughly the first two-thirds of the day, which may help sleep and appetite too.

8. Go to bed in line with your own clock; shift workers fight their biology.
St-Onge knows of no data behind 'every hour before midnight is worth two.' But going to bed far later than your usual time puts you out of sync with your circadian system and makes good sleep harder. Shift workers try to sleep during the day when their biology isn't set up for it. On naps, she says the data are thin, but avoid napping close to bedtime so you keep your sleep pressure.

9. Small dietary tweaks can modestly raise calorie burn, and they may add up.
Medium-chain triglycerides (MCTs) go straight to the liver and are burned more readily than long-chain fats, raising the thermic effect of a meal in men and women. Over time her studies found better body composition and greater weight loss with MCT oil than with olive oil. Ginger raised calorie burn after a meal, possibly via the capsaicin receptor. She thinks such effects could be additive since they act through different mechanisms, though that hasn't been tested.

EXAMPLES

1. Nurses' Health Study (2006)
Nurses tracked over about 14 years who reported sleeping 5–6 hours gained weight at a much higher rate than those sleeping 7–8 hours. St-Onge cites it as foundational evidence.

2. Her inpatient sleep-restriction study
Participants who normally slept 7 or more hours (measured by wrist-worn activity trackers) averaged about 7.5 hours with a 9-hour sleep opportunity, versus about 3 hours 50 minutes with 4 hours in bed, for 5 nights under supervision with no naps. That's roughly half their usual sleep.

3. Two weeks of short sleep, half a kilo gained
Naima Covassin's 2022 study restricted sleep to about 5 versus 7.5 hours a night for 2 weeks, and participants gained about half a kilo. Huberman notes that roughly 3,500 excess calories make a pound, so small daily surpluses add up for night-shift workers, new parents and caregivers.

4. Coffee mannan oligosaccharides
In an industry-sponsored, placebo-controlled study, sachets of fibers extracted from spent coffee grounds improved body

composition (fat loss) in overweight men but not women. The company dropped the product, so it isn't available.

5. Kefir: a null result

In her master's work at McGill, men with mildly high cholesterol drank about 500 ml (two measuring cups) of kefir daily versus milk for a month, with no effect on cholesterol synthesis. She still favors fermented foods to 'feed your gut' and notes that other outcomes weren't measured.

6. Ginger beverage

Ginger powder dissolved in warm water was compared with plain hot water in a one-time crossover test. Calorie burn after the meal, measured for several hours under a metabolic hood, was significantly higher with ginger.

7. Corn-oil chips and the portfolio diet

In a 25-day crossover snack study, corn-oil chips produced a better blood fat profile and lower lipoprotein(a) than low-fat or high-saturated-fat snacks. David Jenkins' portfolio diet (soy protein, nuts, plant sterols, soluble fiber, now expanded to legumes and olive oil) matched a statin's cholesterol reduction head-to-head.

OTHER RELEVANT

1. Using MCT oil

Asked whether a tablespoon or two a day is the typical approach, she agrees, but it should replace other oil, not be added on top.

2. Get snoring and unrefreshing sleep tested

If you snore, wake unrefreshed or feel sleepy by day, talk to your doctor. Polysomnography is the standard test, but in-home testing is easy to prescribe. CPAP machines need a prescription because the pressure has to be set for you.

3. High-volume plant foods for fullness

She doesn't pit plants against animal foods. High-volume, lower-calorie plant foods fill you up, nuts prolong fullness, and animal products are fine with attention to portion size. Huberman flags starch-fat-sugar combinations as the easiest foods to overeat.

4. Match oils to their smoke points

Use each oil for its appropriate cooking temperature. For example, don't heat flaxseed oil to high temperatures.

Peptides: The Science, Uses & Safety | Dr. Abud Bakri

Guest: Dr. Abud Bakri
Date: 2026-06-01 · Duration: 2:48:23
URL: https://www.youtube.com/watch?v=_DfqnpSbMfE

KEYPOINTS

1. BPC-157 comes from a protein in gastric juice
Bakri, an internal medicine physician, explains that in 1991 a group in Croatia isolated a large protein, BPC, from gastric juice. BPC-157 is a 15-amino-acid fragment of it, and the body doesn't make that fragment on its own, despite what is often claimed online. The researchers were following two leads: Pavlov had sold dogs' gastric juice as a remedy for stomach complaints, and Hans Selye showed that stress damages the stomach lining, so they suspected the gut produced something protective.

2. BPC-157 seems to boost healing rather than suppress inflammation
In animal models it increases VEGF signaling and new blood vessel growth, helps cells move into wounds, adjusts nitric oxide production and, in one tendon model, increased growth hormone receptors on the tendon. Mice given corticosteroids, which normally slow wound healing, healed as well or better when BPC was added. Bakri finds its gut and brain effects more interesting than the muscle-and-joint hype. In mice it reduced intoxication from alcohol and blocked withdrawal symptoms.

3. The human evidence for BPC-157 is thin
Almost all the animal research comes from the single Croatian group. In humans there were only small phase 1 and phase 2 trials of BPC enemas in the early 2000s: no adverse events in phase 1 and a positive signal for ulcerative colitis in about 40 patients in phase 2. Nobody knows the right human dose. Most people inject 100–200 mcg a day based on what research websites sell, and Bakri suspects the effective dose is far higher.

4. The cancer question is still open
There is no sign of cancer in the animal research, and Bakri says there's no mechanism by which BPC would cause cancer the way smoking does. Because it promotes blood vessel growth, though, it could in theory feed an existing tumor. One melanoma cell study showed it reduced VEGF. Online users report worsening hematomas, and a physician friend of Huberman's noticed his facial spider veins getting worse.

5. In the US, the legal status is unsettled
BPC-157 was never FDA-approved. In late 2024 it and about 20 other peptides were moved to the FDA's 'category 2' list, which blocks compounding. That pushed people toward 'research use only' gray-market vials, which can vary from batch to batch. As of this conversation, BPC-157 had been taken off category 2 but not yet added to category 1, the list that would let doctors prescribe it through compounding pharmacies. Black-market powder from China costs about $5 a vial to make.

6. Khavinson's 'bioregulator' peptides are meant to keep working after you stop
Soviet researcher Vladimir Khavinson isolated short peptides from organs. Examples are pinealon (the tripeptide EDR, with no known receptor), epitalon from the pineal gland, and several thymus peptides. The idea is that short courses shift gene activity and the benefits continue afterward. Bakri repeatedly attaches a caveat: the evidence is largely Russian literature.

7. Thymosin alpha-1 stimulates T-cells
The thymus grows from birth until puberty and then shrinks. Thymosin alpha-1, a peptide of about 21 amino acids from Goldstein's lab, helps T-cells develop and multiply. It's approved in other countries as an add-on therapy for hepatitis B and C and some cancers, but results for sepsis and infection have been unimpressive. Bakri, speaking from personal use and not as a recommendation, injects 2.5 mg twice a week while traveling and on hospital rotations.

8. Restoring growth hormone with age is a double-edged choice
IGF-1 falls dramatically between 18 and 50 (sometimes called somatopause). Growth hormone benefits skin, sleep, recovery and the thymus, and no one thinks it causes cancer. However, it could speed up an existing cancer, it isn't good for heart and metabolic health, and growth hormone–deficient models live longer. Huberman's example is that large, high-IGF-1 dog breeds live shorter lives.

9. Some GLP-1 side effects may come from misuse
Bakri sees GLP-1 drugs as 'training wheels' for weight loss. He suspects that reported cognitive problems may stem from doses that are too high, too few electrolytes or nutrients, low blood sugar, or eating less socially, rather than from the drug acting on the brain. Women with obesity sometimes conceive unexpectedly on these drugs because weight loss changes leptin, a key fertility signal.

EXAMPLES

1. Bakri's torn triceps
With a grade 2 triceps tear (his arm bruised purple top to bottom), he injected BPC and other peptides locally at much higher doses than typical. His physical therapist was astonished by his progress at 3 weeks, and he was back in 3–4 weeks instead of the usual 3 months. He admits he can't know whether he would have healed that fast anyway.

2. Huberman's pinealon experiment
Taken at bedtime, pinealon cut Huberman's deep sleep. A small injection when he woke in the middle of the night instead roughly doubled his late-night REM, from about 1.5 to 3 hours, sometimes with grogginess the next morning. He does this about three times a month and reports more REM on the nights in between.

3. The 15-year nursing-home study
Khavinson gave nursing-home residents a pineal extract (epithalamin) plus a thymus peptide (thymalin) in 10–20-day courses

once or twice a year. He reported significantly lower deaths from heart disease, infection and cancer. Bakri calls it the most interesting longevity study he's seen 'if accurate', with the Russian-literature caveat.

4. The 'trinity stack' of the wealthy

Bakri describes people combining a GLP-1 drug, growth hormone or a secretagogue such as tesamorelin, and testosterone therapy for rapid fat loss and muscle gain, a mix behind some CEO and celebrity transformations. Asked whether it's healthy, he says, 'We'll find out.'

OTHER RELEVANT

1. Use peptides under a doctor's supervision

Find a physician who knows peptides and can monitor you. For example, check IGF-1 on tesamorelin and track weight loss on GLP-1s, since some celebrities clearly lost too much. Bakri expects telemedicine options and price competition to improve sourcing.

2. Be wary of 'research use only' vials

Quality varies widely between gray-market batches, and among compounding pharmacies too. Huberman, who has run a lab, jokes that nobody buying them is doing cell culture at home.

3. GHK-Cu is a collagen-related peptide

GHK-Cu is a glycine-histidine-lysine tripeptide bound to copper and found in type 1 collagen in skin, hair and connective tissue. That's why it's mostly used in topical creams and alongside red light therapy, though Bakri notes it has broader effects.

How to Overcome Social Anxiety | Dr. Nick Epley

Guest: Dr. Nick Epley
Date: 2026-05-18 · Duration: 2:30:24
URL: https://www.youtube.com/watch?v=Q2hOryHdgAk

KEYPOINTS

1. We constantly 'mind read', and it's useful but error-prone
Epley, a behavioral scientist at the University of Chicago, explains that we infer thoughts, intentions and attitudes behind other people's behavior, and even behind animals, gods or the planet. The inference helps us explain what someone is doing and predict what they'll do next. It's better than not doing it, but it systematically misfires in predictable ways.

2. With strangers, we use our own minds as the template
When we know nothing about someone, the main tool we have is ourselves: if I feel cold, I assume you do too. Egocentrism also means we overestimate how clearly we come across. We know what we meant, so we assume an email will be read the way we'd say it, and sarcasm or jokes land badly in text.

3. Voice conveys a mind; text is mostly 'dead'
Speech happens as thought happens, so rate, pitch and intonation reveal enthusiasm, sadness, intent and sarcasm. In a study with Juliana Schroeder on the eve of the 2016 election, people who heard Trump or Clinton voters explain their choice rated them as more thoughtful, intelligent and rational than people who read the same words. The effect was strongest when they disagreed with the speaker. Yet most people say they'd rather write to seem smart because they can edit.

4. People underestimate how much others want to connect
Across more than 30,000 participants in over 120 experiments, Epley's lab finds people consistently underestimate how positively others will respond when they reach out. If two strangers sit silently next to each other, each reads the other's silence as disinterest, which creates a shared but mistaken belief that nobody wants to talk.

5. Extraversion strongly predicts happiness, and acting extraverted helps everyone
The correlation between daily positive affect and extraversion is about 0.5, comparable to the correlation between fathers' and sons' heights, and about 0.3 for life satisfaction. Ed Diener called it a foundational finding. Will Fleeson's lab studies and Sonja Lyubomirsky's two-week interventions found that acting more extraverted raised positive feelings regardless of baseline personality. Introverts, too, report feeling better with people than alone.

6. Sociability is like exercise: a habit, not a fixed type
Epley thinks the difference between people who seek out connection and those who don't is largely the habits they've built. Avoiding people keeps you from developing the skills to read cues, gracefully exit 'sticky' conversations or spot when someone is busy. Those skills come from approaching.

7. Brief exchanges matter more than we assume
Huberman admits he'd thought of small talk and manners as 'crackers', not nourishment. Both conclude that fist bumps, compliments and quick shared moments create a real sense of kinship. Epley's students hypothesize, though it is untested, that one good exchange with a stranger shifts how you feel about the whole group they belong to.

8. Social anxiety persists because beliefs never get tested
Exposure works because you discover your predictions were wrong. If you never reach out, you never get that disconfirming evidence. Much social anxiety is a fear of seeming creepy or 'too sticky'. Epley's answer is calibration rather than avoidance: friendly is not the same as friends, and if someone doesn't call back, don't ping them a third time.

9. Context and norms shape what counts as polite
Earbuds and phones signal 'don't bother me'. In the UK, and even more in Japan, staying out of strangers' business is itself politeness. Epley cautions that what looks like eroding manners may be people trying not to intrude. He treats a greeting as an invitation the other person can accept or decline.

EXAMPLES

1. Jia Jiang's 100 days of rejection
Trying to desensitize himself to rejection, Jiang made about 106 odd requests: Olympic-ring doughnuts at Krispy Kreme (an employee spent 15 minutes making them), planting a rose in a stranger's yard, co-piloting a plane. Epley's lab coded the videos and found he was accepted about 51 times and rejected about 48, with only around seven showing any negativity. Jiang's takeaway was that other people are far kinder than he expected.

2. The underestimation-of-compliance effect
Frank Flynn (Stanford) and Vanessa Bohns (Cornell) found people overestimate how many others they'll need to ask before enough say yes. Epley adds that helpers also feel better than requesters expect. Asking someone to take your photo feels like a burden but usually makes them happier.

3. Gustavo on the train
Epley sat beside a young man with earbuds and greeted him. The man took one earbud out, offered a fist bump, then proudly showed his binder from a culinary trade program. Epley left the 30-minute conversation feeling more hopeful about young people in general.

4. The red glasses compliment
On his way to the train, Epley told a stranger her red glasses looked fabulous. She stopped, took them off and said she really needed that today, a small example of how much a passing compliment can mean.

5. Data-driven courage to adopt

After a painful loss, Epley's wife asked whether he'd consider adopting a child with Down syndrome. He was full of doubt, then recognized he was making the same overly pessimistic forecast as his participants. He notes their resources and strong marriage made it feasible, and the family traveled to China to adopt.

OTHER RELEVANT

1. Talk, don't type, when it matters

For apologies, delicate news or anything involving humor or sarcasm, call or speak in person. Text strips out the cues that show you're a thoughtful person with good intentions.

2. Treat your predictions as hypotheses

Before skipping a conversation because 'they won't want to talk', remember that the data consistently show this guess is too pessimistic. Make small, low-cost overtures, like a greeting or a question about someone's day, and see what happens.

3. Ask for help more often

Requests are granted more often than you expect, and helping feels good to the helper. Accept alternatives gracefully: when Jiang couldn't announce his love of Costco over the intercom, the manager took him to lunch instead.

4. Calibrate eye contact and persistence

Keep your gaze moving rather than fixed. In Huberman's story, a well-liked college roommate unsettled people by staring until he was told to keep his eyes moving. Respect clear signals such as someone being on a call or not replying.

Master Self Control & Overcome Procrastination | Dr. Kentaro Fujita

Guest: Dr. Kentaro Fujita
Date: 2026-05-11 · Duration: 2:27:49
URL: https://www.youtube.com/watch?v=e89rVf4Pf0k

KEYPOINTS

1. Self-control is a trade-off between smaller-sooner and larger-later rewards
Fujita uses Walter Mischel's Stanford 'marshmallow test' (1960s–80s) as the textbook example. A child can eat one marshmallow now or wait for the experimenter to return and get two. How long the child waited became the classic measure of delay of gratification, and follow-ups linked longer waits with better grades, income, friendships and health and lower incarceration.

2. The marshmallow findings are contested but not dead
A large replication with 4-year-olds found the expected correlation, but it disappeared after controlling for 30–40 covariates such as socioeconomic status. That was a fair concern, since the original Stanford daycare children were mostly well-to-do. Yuko Munakata's team reanalyzed the same data using fewer, theory-driven covariates and found waiting still predicted later problem behavior. Fujita's takeaway: setup matters, especially whether the child trusts the experimenter to deliver.

3. Self-control is not a muscle that runs out
The 2000s 'ego depletion' boom claimed one effortful task (such as writing with your non-dominant hand) weakens performance on the next (such as the Stroop color-word task). Multi-lab replications gave mixed results. The failed one was led by the theory's originators, which was seen as damning, and Fujita says the field's consensus is that the effect does not reliably occur.

4. Willpower training barely works; strategy training does
Fujita defines willpower as effortfully suppressing an impulse. Training it with thousands of Stroop trials or a week of using your non-dominant hand produces small, highly variable gains, and many people gain nothing. The children who waited longest did not just grit it out. They covered their eyes, turned away, or imagined the marshmallows as puffy clouds or framed pictures. These strategies can be taught.

5. Self-control is distance-dependent: 'why' far away, 'how' up close
When a goal is far off, hypothetical or about someone else, people think abstractly about why it is desirable. When it is imminent, they think concretely about how to do it, which for hard things is unpleasant. In Fujita's lab, people who first spent time thinking about why they pursue their goals (even unrelated goals) showed better self-control on a later task than those who thought about how.

6. Hot cues can help, not just cool ones
Mischel's model held that you should 'cool' emotional thinking about temptations. When Huberman suggests picturing a cockroach on the cake or fearing showing up to an exam unprepared, Fujita calls the point profound. For short-term battles, the immediate downsides or upsides work; for long-term battles, think in long-term outcomes. Different tools suit different people, which is why he and Ethan Kross describe a 'self-control toolkit.'

7. Self-control conflicts shouldn't be a fair fight
Stack multiple 'whys' behind a goal: health, setting an example for your kids, proving you can do it, becoming the person you want to be. Success then feeds self-efficacy in a virtuous cycle, while giving up can trigger a downward spiral of 'I'm not capable.' Fujita adds that this kind of reflection can take as little as a minute.

8. Abstinence and moderation each have costs
Consistent streaks carry their own motivational pull, but they make behavior rigid: one lapse ends the streak and can collapse the goal. Abstinence also pre-decides choices and avoids backsliding. Moderation, planned occasional indulgence with the goal in mind, is not the same as a rationalized lapse. Abstinence suits all-or-none goals like fidelity; a study break before an exam suits moderation.

9. People misjudge which strategy shows self-control
Initial findings from Fujita's lab, with his student Fung Lai, show people rate someone who abstains as having more self-control than someone who moderates. Fujita says moderation is in principle the harder skill, and suspects this bias leads people to choose rigid plans that do not fit their goal or personality.

10. We pursue many 'invisible' goals at once
Society trains single-goal pursuit, sacrificing everything for one aim. That can be productive, but people actually juggle work, family, friends, health and creativity. Fujita suggests deliberately dividing effort across these goals may serve all of them better and relates to burnout.

EXAMPLES

1. The 15-minute wait nobody finished
Fujita calls it the 'dirty little secret' of the original studies: no child waited the full 15 minutes. Researchers simply timed how long each lasted. Later versions shortened the wait to 10 minutes, which is easier.

2. Thinking like Batman
In a study involving Angela Duckworth and University of Minnesota researchers, children chose a costume such as a Batman cape and cowl and asked 'What would Batman do?' during a self-control task. They outperformed children who did the task normally. Simulating someone else's mind creates psychological distance.

3. Fujita's 500-day Apple Watch streak

His unbroken ring-closing streak became motivating in its own right. It also had him on a treadmill in the middle of the night just to protect the pattern, which he calls 'really stupid' and an example of rigidity.

4. David Goggins' harsh self-talk

Huberman notes that Goggins listens to negative social media comments while running and berates himself to keep going. Fujita says it clearly works for Goggins, but other people need other tools.

5. Huberman's half-hearted HIIT session

Short on time, he let himself do the first two of eight assault-bike rounds 'semi-lazy.' By rounds three and four his motivation had climbed, showing the barrier was the idea of the effort rather than the effort itself.

OTHER RELEVANT

1. Rehearse your whys before temptation hits

Because the concrete 'how' mindset dominates in the moment, deliberately recall the abstract reasons you care just before high-risk situations. Tiredness, anger and alcohol push you toward here-and-now thinking.

2. Create distance physically or mentally

Remove or cover the temptation, talk to yourself in the third person ('What does Ken want to do?'), a tactic from Ethan Kross's work, or ask what someone you admire would do.

3. Stop waiting for perfect conditions

People are endlessly creative at justifying indulgence ('too sunny, not sunny enough'). Optimization culture can become another excuse. Start in imperfect conditions and expect to warm up.

4. Choose abstinence or moderation to fit the goal

Use firm rules for goals that one lapse would destroy. Allow planned breaks where an occasional lapse doesn't undo progress, and consider whether you prefer black-and-white rules or variety.

Tools to Bolster Your Mental Health & Confidence | Dr. Paul Conti

Guest: Dr. Paul Conti
Date: 2026-05-04 · Duration: 2:10:02
URL: https://www.youtube.com/watch?v=cWCs7dxrt-A

KEYPOINTS

1. Start from what's going right
Psychiatrist Paul Conti, discussing his book 'What's Going Right', argues that the mental health system teaches people to see themselves through what's wrong and to wear labels that can deepen helplessness. Yet there is 'far more going right in any of us than there is going wrong if we're here.' Starting from strength makes it easier to look honestly at what you want to change. He insists this isn't Pollyanna thinking: it is consistent with what's true.

2. Compassionate curiosity is the core tool
Most people avoid looking at themselves because they fear what they'll find or don't believe they can change. Conti's remedy is to approach yourself with curiosity that isn't harsh: what runs through everything I do, how am I different in different situations, and when am I presenting a false self that even I know is false? Curiosity can be serious or light-hearted, but it has to be there.

3. Your self-talk is the first place to look
Notice what you say to yourself in quiet moments, when no one is listening or there's a pause in the action. Some people repeat intrusive messages hundreds of times a day without noticing them. Becoming aware of those messages is the entry point to the 'structure and function of self' that Conti says all humans share.

4. Intrusive thoughts always have a meaning
Conti's approach is to identify the repeated thought, then ask what purpose it serves. Constantly telling yourself 'nothing is going to be okay' may be an attempt to protect yourself from future shock, or a sign of an unprocessed loss. If thoughts or worries reflect real danger, change the situation. He also notes that medication can sometimes help.

5. Balance external check-ins with time alone
Constant streams of other people's lives make it hard to know what you yourself prefer. Conti suggests a 'sweet spot': check in with trusted people, similar people and different people, but spend enough time alone that you think through life's questions on your own first. Social media can strengthen your sense of self, for example by helping you find kindred spirits, or it can distract you from it. Honesty about which it is doing is what matters.

6. Doing versus reflecting: the test is happiness
Huberman asks whether people who simply 'do' without introspection are missing something. Conti says the real question is whether that person is happy. Some active people are meditative while moving, and forcing stillness on them can be an external imposition. Using tools like NSDR to be at your best is different from trying to control your states because you think something is wrong with you.

7. Asking 'why' restores agency
When someone knows they should exercise or stop seeing a draining friend but doesn't, Conti calls those behaviors 'X marks the spot': places to dig. The reason might be a need to be liked, putting others first, or fear of failure after earlier attempts. Realizing you are copying or rebelling against a childhood pattern gives agency back, because nobody wants to be 'programmed' like the Manchurian Candidate. The goal is for 'the whole me' to decide, even if the decision is not to go.

8. The limbic system doesn't know the clock or the calendar
You can say 'that was then, this is now', but emotional systems don't track time. When strong feelings drop you into the past, that is a marker of something from that time you haven't worked through. People often fear it means they're going crazy. Conti says these moments point to where to dig, because emotionally the past is still in your present.

9. Happiness is peace, contentment and delight, not escape
Conti rejects 'happy-go-lucky' as the goal, because it implies being unaware of how hard life can be. Contentment means holding awareness of both what went well and what didn't, even tragedies. Delight is something we all had as children and can recover. Escapes, including substances, feel good for a couple of hours 'but at what cost?'

EXAMPLES

1. 'I don't get stressed, I give stress'
Huberman's former colleague said this. Asked whether people treat themselves the way they treat others, Conti says the saying has no general validity. Someone calm inside while stressing everyone else 'is not a healthy way to be'. More commonly, people treat others far better than they treat themselves.

2. The gym, sized down
A patient keeps aiming for five gym visits, fails, and then goes zero times. Conti helps them settle on Monday and Friday, or even once a week, because one success builds on itself. He warns that expecting change faster than it can happen leads to giving up within about two weeks.

3. Larry Squire's wall of photos
Huberman describes memory scientist Larry Squire filling his walls with photos of people, places and experiences he liked: 'a vessel of awesome memories.' Conti frames this as taking control of the climate within us, priming the mind with what's gone right.

4. Parenting by reaction
Conti describes a parent who pushed so hard against how they were raised that they realize they're letting their kids run wild

in ways that aren't even safe. It was an automatic reaction to a trigger, not a choice. Seeing the pattern lets the whole self decide how to parent.

OTHER RELEVANT

1. Do a self-talk audit

Several times this week, pause and note the exact phrases running in your head. For each repeated one, ask what it's protecting you from and whether it points to something unprocessed.

2. Look at childhood without a dog in the fight

To heal earlier trauma, Conti recommends looking at the past without needing it to be less bad, or the worst, than it was. Overwhelming trauma can make intentional living harder but doesn't prevent it. A cycle of self-criticism after repeated failed attempts can be just as limiting.

3. Surround yourself with good memories

Put up photos of experiences and people you loved. It is a cheap way to bias your mind toward what's going right without ignoring difficulty.

How to Better Regulate Your Emotions | Dr. Marc Brackett

Guest: Dr. Marc Brackett
Date: 2026-04-20 · Duration: 2:27:38
URL: https://www.youtube.com/watch?v=FBgM7jndkLQ

KEYPOINTS

1. Emotion regulation means changing your relationship to a feeling, not deleting it
Brackett, who has lived with anxiety for much of his life, sometimes simply greets it ('Hey, how you doing today?'), and it either fades or just sits there. Checking in on your feelings all day would be paralysing. Emotions mostly matter when something shifts, such as an offensive remark, and the choice you make then is 'where the magic happens.'

2. His working formula: regulation = goals + strategies, chosen according to emotion, person and context
Brackett writes it as ER(G + S) = f(E + P + C). The goals follow the acronym PRIME: Prevent unwanted emotions, Reduce difficult ones, Initiate emotions (for example, creating energy in a room when teaching or leading), Maintain a good state, and Enhance or boost one. Which strategy works depends on the specific emotion (anxiety and anger need different tools), on the person (he describes himself as neurotic and introverted) and on context. Leaving a podcast mid-recording to go for a run isn't an option, so in that setting he needs cognitive or breathing tools.

3. Start with your mindset: there are no bad emotions, only unhelpful ways of handling them
When Brackett asked Huberman about his relationship to anxiety, the reflexive answer was 'I hate it.' A neuroscientist friend once had Brackett list everything that made him anxious (fundraising, research quality) and then asked what those things had in common. The answer was that they all mattered to him. Brackett frames anxiety as a signal of perceived uncertainty about something you care about. Treating it as bad by default 'puts you on the path to dysregulation.' The two agree that every emotion is acceptable to feel, but its expression has to fit the context.

4. Precise labels matter because each emotion carries a different underlying appraisal
Brackett calls most people's emotional vocabularies 'awful' ('I'm fine,' 'I'm upset'). He separates terms by their core relational themes. Anxiety is uncertainty about a future you can't predict or control. Stress is too many demands for too few resources. Pressure means something is at stake and depends on your performance. Fear is immediate danger. Anger isn't disappointment, envy isn't jealousy, and happiness isn't contentment. The right label points to the right strategy, but he says labeling is 'necessary but not sufficient.'

5. Boys are socialized, not born, to suppress emotion
Brackett argues that boys learn early that sadness or fear signal weakness, and sometimes homosexuality, which is its own stigma. So they suppress, deny and ignore, while research shows women suppress less but ruminate more. Fathers use more feeling words with daughters than with sons. Teenage boys at schools using his program couldn't see what was wrong with crying, which suggests the pattern can be retrained.

6. Leaders who co-regulate measurably change the culture around them
In Brackett's longitudinal study of schools during the pandemic, teachers who saw their leader as both self-regulated and good at co-regulating reported better outcomes. That perception strongly predicted school culture, burnout and job satisfaction, and frustration was 40% lower where leaders had these skills. He tells Yale first-years that SAT scores predict little among admitted students because of range restriction, and that skills like taking feedback now matter more.

7. Intentional co-regulation aims for the other person's independence, not dependence
Brackett contrasts a fearful parent at the playground ('be careful, be careful') with one who acknowledges their own nervousness, moves closer just in case, and says 'I really do think you're going to make it.' Projecting your fear undermines a child's confidence. Skilled co-regulation supports someone through an emotion so that they eventually regulate on their own. He calls this 'not codependent, not coddling.'

8. Know your assumptions, but don't turn introspection into rumination
Both men stress auditing the beliefs about emotion you absorbed growing up. Huberman's father was taught that smiling a lot meant you were stupid. Huberman also caught himself thinking 'you idiot' when a friend's bird kept hitting windows, a habit from growing up in a 'big pack of dudes.' Brackett compares this to a scientist knowing their assumptions before forming a hypothesis, but warns that too much introspection becomes rumination.

9. Breathing and meditation lower arousal but don't change your perspective
Brackett fully endorses meditation, echoing Richie Davidson's point (from an earlier episode) that it trains stress tolerance, but calls it necessary but insufficient. His joke from his book: a deep breath around his mother-in-law only made clearer why she had to leave his house. Lasting change needs cognitive strategies such as reappraisal, reframing and distancing, or sometimes calling a friend after 15 deep breaths have failed.

EXAMPLES

1. The London 'fishbowl' demonstration
Early in Brackett's career, a headmistress outside London warned that his program would 'turn the boys into homosexuals.' With about 25 teachers watching, he told roughly 20 students how discouraged and hopeless he felt after failing his yellow belt in karate as a bullied kid. He then asked who else had felt that way, and every child raised a hand. His takeaway: 'Kids are dying to express their emotions, boys and girls.'

2. The boy in the blue quadrant
A boy at a school using the Mood Meter said he was in the blue (low, sad) quadrant but declined help: 'I don't want to bother you, sir.' Brackett found it an eye-opener about how early children learn not to ask for support.

3. The post-election 'take the day off' email

After the last US election, one school told students they could stay home if they felt overwhelmed by their feelings. Brackett 'almost had a conniption.' Emotional intelligence, he argues, means learning to live with difficult feelings and move forward, not using them as an excuse. He says allowances like this would create 'a generation of very weak people,' which is the opposite of what his work aims for.

4. Documentary listening study

His partner made a pandemic-era film, America Unfiltered, interviewing gun shop owners, Black mothers whose children were killed by police, and new citizens. Brackett had viewers rate the subjects' warmth before and after watching. Initial judgments were biased by race and by whether the person held a gun, and they shifted markedly once viewers heard the stories.

OTHER RELEVANT

1. Use a meta-moment before you react or walk into a new setting

Brackett developed this with therapist Robin Stern. Notice the trigger, pause and breathe, then picture your best self in your current role (partner, parent, professor) and respond through that lens. Ideally do it proactively, for example before walking into your house after a bad day, to prevent 'incidental leakage' of irritability onto your family. Sometimes you need a 'mega moment,' such as three laps around the house.

2. Build your emotional vocabulary

Practice telling anxiety from stress, pressure, fear and overwhelm, and anger from disappointment. Brackett's How We Feel app is designed to supply the words. The accurate label is what tells you which strategy to use.

3. Judge any strategy by whether your life is actually working

Brackett, a former fitness instructor, saw people use exercise and food as an escape while believing it was healthy, and reframing can turn into self-deception. His test is whether your relationships and work are improving.

4. Practice connection deliberately

Brackett ends with a card game built from his books, called Point of Connection, with prompts like the best advice a mentor gave you or who your heroes are. Players go around a circle and look for overlap. He offers it as a low-tech antidote to disconnection, and it needs no app or Wi-Fi.

How Women Can Improve Their Fertility & Hormone Health | Dr. Natalie Crawford

Guest: Dr. Natalie Crawford
Date: 2026-04-13 · Duration: 2:36:02
URL: https://www.youtube.com/watch?v=RTPNJgHeZBI

KEYPOINTS

1. Fertility is a whole-body health marker
Crawford, a reproductive endocrinologist who has been through infertility herself, notes that ovulation, fertilization and implantation require many systems to work. Infertility is associated with higher rates of metabolic syndrome, cancer, heart attack, stroke and early death. That's not because infertility causes them, but because it's often an early warning sign of chronic inflammation or insulin resistance.

2. Egg quantity and egg quality are different things
Quality means genetic normalcy and competence, such as healthy mitochondria. There's no direct test, so doctors approximate it by age, though 'not all 40-year-olds are created equal', and worsening metabolic health adds to age-related genetic errors. Quantity (ovarian reserve) can be estimated with a simple blood test for anti-Müllerian hormone (AMH), made by granulosa cells around each follicle.

3. Crawford thinks every woman who may want children should get an AMH test
She acknowledges this goes against the American College of Obstetricians and Gynecologists, which advises testing only for infertility because a low result is stressful and doesn't predict natural conception that month. True, she says, but a low AMH means a shorter timeline, fewer eggs for freezing or IVF, and earlier menopause. Its causes, including autoimmune disease, insulin resistance, endometriosis and smoking, can themselves cause infertility. In about half of low-AMH cases, she says, an investigation finds a cause. Birth control, pregnancy or postpartum can temporarily suppress AMH.

4. Tracking ovulation beats tracking periods
Regular bleeding is good, but knowing when you ovulate reveals the length of your follicular and luteal phases. Ovulation disorders progress predictably. The first stage is a luteal phase defect, with progesterone lasting fewer than 11 days, which can occur even with regular cycles.

5. The fertile window is narrow
Sperm can live up to five days in the reproductive tract, though most last about two. Intercourse in the two days before ovulation and on the day itself carries roughly a 20–30% chance of pregnancy per cycle; the day after ovulation is essentially zero. Timing intercourse to detected ovulation shortens time to pregnancy.

6. NSAIDs around ovulation can block egg release
Ovulation is an acute inflammatory event: the follicle has to rupture. Ibuprofen or naproxen near ovulation can let the hormonal changes happen without the egg being released. Crawford tells patients trying to conceive to use these only during their period. The goal is to lower chronic inflammation, not switch off the immune system, which ovulation and implantation need.

7. Five non-negotiables: sleep, stress, muscle, food, toxins
Crawford rejects the idea that fertility is all luck. Even though you can't control everything, metabolic and cellular health are highly modifiable for both partners. Earlier attention to inflammation, such as treating endometriosis, diagnosing Hashimoto's early or managing autoimmune disease, may also help extend ovarian lifespan. Women with premature ovarian insufficiency show more ovarian inflammation and fibrosis.

8. Sleep directly shapes reproductive hormones
FSH and LH are released in the early morning hours. Short sleep is linked to lower testosterone and sperm counts in men, fewer eggs retrieved at IVF in women, and roughly double the rate of infertility when people report poor sleep. Crawford recommends 7–9 hours (closer to 7.5 for most women, especially in the luteal phase), with consistent timing shared with your partner.

9. Egg freezing is an investment, not an insurance policy
Stimulating extra eggs that would otherwise be lost each month lets doctors bank them, and Crawford says it doesn't cause early menopause. Insurance always pays out, whereas frozen eggs are more like a stock-market investment: likely to pay off, but not guaranteed.

EXAMPLES

1. Cannabis is the most concerning exposure Crawford sees
About 15% of US women report using cannabis while pregnant. In men, cannabis lowers sperm production, testosterone and DNA integrity, with higher miscarriage rates for partners. When embryos unexpectedly stall on day three in IVF, she says the male partner turns out to be a cannabis user he had denied about nine times out of ten. In women, use in the prior year is linked to about 25% fewer eggs at retrieval and 28% lower fertilization. THC crosses the placenta.

2. Smoking reaches the egg supply
Crawford calls cigarette smoking one of the few exposures that gets 'into the vault' and reduces egg count, leading to earlier menopause and poorer egg quality. Data on oral nicotine pouches are thinner, but she advises against nicotine in any form while trying to conceive. Huberman says that in an informal show of hands, 30–40% of about 4,000 young adults he spoke to used oral nicotine daily.

3. Endocrine disruptors and IVF outcomes

Microplastics can accumulate in the ovary. Population cohort studies, not randomized trials, link plastic-associated chemicals to longer time to pregnancy and lower live birth rates. Among IVF patients, those with more endocrine disruptors had fewer eggs and embryos and poorer sperm. Thermal-paper receipts are a major BPA source for cashiers, and scented products often carry phthalates.

4. Advanced paternal age

After about 50, men show population-level increases in new dominant mutations and in offspring rates of autism and schizophrenia. Crawford stresses the absolute risk is still small, so most babies will be healthy. Banking sperm younger makes sense if it's an option.

OTHER RELEVANT

1. Pre-conception supplements Crawford considers universal

A prenatal with folic acid, CoQ10 (which she says has robust human data), omega-3s and vitamin D, ideally started months before trying. She usually stops CoQ10 in pregnancy for lack of data. For sperm: L-carnitine, plus zinc and selenium. She sometimes uses NAD/NMN only for unexplained infertility, where human data are still limited.

2. Low-dose melatonin only, if at all

Crawford says 1–3 mg about 30 minutes before bed may support egg quality and odds of pregnancy. Many over-the-counter products contain about ten times that, and a 1 mg pediatric dose is often enough. The aim is to augment your own melatonin, not replace it.

3. Stop the pill three to six months before trying

This gives you time to learn your cycle and detect ovulation, so any abnormality is investigated right away rather than after 6–12 months of trying. Progesterone IUDs tend to suppress ovulation mainly in the first two years.

4. Choose 'fragrance-free', not 'unscented'

'Unscented' products can contain masking fragrances. Crawford flags lavender, tea tree and evening primrose oils as having more endocrine activity. Aim to reduce toxin exposure without an all-or-nothing mindset, since you can't avoid everything.

5. Advocate for your own testing

If your doctor won't order AMH, Crawford suggests self-ordering through a lab or consumer testing service, or calling a fertility clinic directly and asking for fertility testing.

Cultivating Awe & Emotional Connection in Daily Life | Dr. Dacher Keltner

Guest: Dr. Dacher Keltner
Date: 2026-04-06 · Duration: 2:20:19
URL: https://www.youtube.com/watch?v=Tmw2dW0a9DY

KEYPOINTS

1. Emotion science grew from six facial expressions to about 20
Paul Ekman's New Guinea work established six static expressions: anger, fear, sadness, disgust, surprise and a smile. Their universality has been contested by Jim Russell, Lisa Feldman Barrett and others. Keltner's lab and others, including Jessica Tracy and Disa Sauter, have since documented roughly 20 distinct expressions, including awe, love, compassion, embarrassment, shame and pain. Ekman himself told the young Keltner to study awe.

2. About half of emotional expression appears to be hardwired
Keltner's former student Alan Cowen worked with Google engineers to have AI code facial expressions in millions of videos from 144 cultures, which once took an hour of manual coding per minute of video. They found about 75% overlap across cultures in how 16 expressions show up in situations like fireworks, a test or laughing with friends. Keltner's estimate is that 50 to 60% of emotional expression is hardwired, with the rest varying in interesting ways.

3. Awe can be measured
Despite its reputation as ineffable, awe has a recognizable vocal burst ("whoa"), facial expression, goosebumps, higher vagal tone and deactivation of certain brain regions. Keltner's lab studied it in the field: beside a T. rex replica in Berkeley's paleontology museum, under giant eucalyptus trees, among veterans whitewater rafting with Stacy Bare, and at the first view of Yosemite. There, Yang Bai asked hundreds of travelers how they felt and heard "small and quiet, but part of something really large."

4. Going from small to vast is the core of awe
Huberman notes that a widening visual aperture, as when you come out of a tunnel into a valley, shifts the nervous system toward parasympathetic calm. Keltner says Pixar's Pete Docter uses the same move in films: narrow, tense framing that suddenly opens onto vastness. It also works metaphorically, as when a cellist's five hours of narrow daily practice becomes part of history on stage.

5. Visual aperture changes time perception
Huberman explains that narrow focus, as when waiting in line or watching a typing indicator, makes the brain take more snapshots, so time drags. That's also why a car crash can feel like slow motion. Panoramic views mean fewer snapshots and a more relaxed state. Awe also links us through time: Keltner describes the smell of eucalyptus on his first day at UC Santa Barbara instantly connecting him to his childhood near UCLA.

6. Collective awe synchronizes bodies and brains
Research on brain synchronization shows heart rates and brain activity aligning at concerts and games, and infants syncing to their culture's music. Keltner calls this a materialistic account of Émile Durkheim's "collective effervescence." Music can unite a crowd within milliseconds in a way a classroom rarely manages. He and Jonathan Haidt argued early on that awe helps a highly cooperative species fold into groups.

7. Self-focus is awe's great enemy
Keltner quotes Emerson: in awe, "all mean egotism vanishes." Citing Jean Twenge's longitudinal data, he says we've grown more self-focused, with a large share of photos now of ourselves, and that worrying about status or money suppresses awe. Both men describe stories that cocaine, "the me drug," ended the communal feel of the Grateful Dead and Laurel Canyon scenes.

8. Embarrassment signals commitment to the group
Keltner first noticed embarrassment after startling people in Ekman's lab: blushing, averted gaze, hiding the face. When people show embarrassment we like and trust them more. Huberman relays a point from Dr. K: a man who doesn't get embarrassed after a clumsy pickup line comes across as creepy. Patients with orbitofrontal damage, studied with Bob Knight, don't show embarrassment when they should.

EXAMPLES

1. The awe walk study with older adults
With Virginia Sturm at UCSF, adults aged 75 and older took a weekly half-hour awe walk for 8 weeks. They went somewhere new, slowed down, timed their breathing to their steps, and shifted from small to vast: a leaf to the whole tree, one child's laugh to a playground's chorus. They felt more awe and kindness, the photos they took showed more of their surroundings, and they reported less physical pain. Keltner says six years later they're seeing signs of better brain health.

2. Awe and health
Keltner cites findings that awe reduces inflammation and raises vagal tone, and that about a minute of awe a day reduced long COVID symptoms. He says doctors are starting to think about prescribing nature and music for this reason.

3. Fraternity nicknames
In an early study, groups of four fraternity brothers at the University of Wisconsin made up nicknames from each other's initials and teased one another, often profanely. Teasing tended to accuse someone of breaking a group norm, like passing out drunk in the street. The more embarrassment was shown, the more they liked each other, and playful teasers who reinforced norms without humiliating were most popular. Keltner separates this from bullying, which excludes or humiliates.

4. Stories of awe from 26 countries

Collecting about 2,600 accounts of awe worldwide, Keltner found sports everywhere, from Brazilian football to Red Sox stories, but no one named Facebook or Instagram. He cites a sociology paper comparing Pittsburgh Steelers fandom to religion, with rituals, towels and "Steeler Nation" bars, and describes Steve Kerr looking up at 10,000 dancing fans.

5. Joe Strummer's campfires

Huberman describes the Clash frontman hosting late-night campfires open to anyone, with music and talk until 2 or 3 am. Keltner notes campfires go back several hundred thousand years, and that small-scale societies tell stories of connection around them. Huberman adds that a fire provides long-wavelength light at night.

OTHER RELEVANT

1. Take a weekly awe walk

Pick a route with some surprise or childlike wonder, slow your pace, deepen and sync your breathing, and keep shifting attention from details to wholes: points of light to patterns of light, single clouds to whole skies. About 30 minutes is enough.

2. Design awe into shared spaces

To counter loneliness and alienation, Keltner suggests rewilding parts of cities, adding public art and music, creating face-to-face encounters and collective rituals like a town-square yoga class, and showcasing moral beauty: other people's courage and kindness. His climbing gym, with monthly local art, music and saunas, is his model.

3. Psychedelics: promise and caution

Keltner links the classic psychedelics, as distinct from MDMA (an empathogen) and ketamine (a dissociative), to awe: a vanishing self and connection to vast things. He cites Molly Crockett's finding of greater kindness a year after festival use, and promising data for death anxiety, addiction, PTSD, OCD and panic. He worries about casual microdosing "like coffee" without guidance, urges honoring Indigenous traditions, and both men caution people with psychosis or bipolar disorder in the family.

How Hormones Shape Sexual Orientation & Behavior | Dr. Marc Breedlove

Guest: Dr. Marc Breedlove
Date: 2026-03-30 · Duration: 2:11:18
URL: https://www.youtube.com/watch?v=6-mEiwe2NhE

KEYPOINTS

1. Finger-length ratio is a window onto prenatal testosterone
The 2D:4D ratio (index finger length divided by ring finger length) is smaller on average in males and is already present in nine-year-olds, before puberty. Breedlove, a Michigan State neuroscientist, says that points to prenatal testosterone. In mice the difference disappears when the androgen receptor is knocked out, and the growing bones of the fourth digit carry more androgen receptor than those of the second.

2. Lesbians average a more masculine digit ratio; gay and straight men don't differ
In Breedlove's original Bay Area study (he measured every digit himself, twice), lesbians had more masculine ratios than straight women, a finding confirmed across labs and now a third meta-analysis. Gay and straight men showed no difference. He reads that as suggesting prenatal testosterone nudges attraction toward women, and that gay men probably received similar testosterone but their brains responded to it differently.

3. Gay men are not 'under-masculinized' where the big sex differences lie
The largest human sex differences are in sexual attitudes — interest in multiple and younger partners, casual sex, visual pornography — not math or verbal skills. On all of these, Breedlove says, gay men are 'totally masculine', which undercuts the old stereotype of low androgen exposure. If anything, testosterone measurements pointed the other way.

4. Group differences offer almost no individual prediction
Height differs between the sexes by about two standard deviations: guess 'male' above 5'5½" and you're right only about 80% of the time. The digit-ratio difference is about half a standard deviation, a quarter of that. His joke: to guess orientation from a hand and be right about 95% of the time, always guess 'straight'. Your own ratio tells you nothing about your prenatal hormones.

5. The 'fraternal birth order' effect is one of sexuality's most robust findings
First noticed by Ray Blanchard and replicated worldwide: a boy with no older brothers has about a 2% chance of being gay. Each older brother from the same mother raises the odds by about a third (2.6%, then 3.5%), linearly, so it would take roughly a dozen to reach 50/50. Gay men had about 140 older brothers per 100 older sisters, versus the usual 105:100.

6. The effect is biological, via the mother
Anthony Bogaert found that older stepbrothers have no effect, while biological older brothers raised apart count just as much, ruling out rough play or bullying. In the maternal immunization hypothesis, the mother's immune system sees Y-linked proteins at each son's birth and makes antibodies that cross the placenta. Mothers of gay younger sons had higher antibodies to neuroligin 4Y, a synapse-building protein. Blanchard estimates about one in seven gay men owe their orientation to this effect.

7. The hypothalamus keeps turning up
Simon LeVay found a preoptic-area nucleus (INAH3), larger in men than women, that was smaller in gay men — comparable to women's. He stressed that adult tissue can't establish cause, since adult brains change: Brad Cook showed a medial amygdala sex difference vanishes within weeks of removing male testosterone in animals. Chuck Roselli studied the minority of rams that never mount ewes, and their preoptic area processes testosterone differently.

8. Partner choice may involve an aversion pathway, not just attraction
Gay rams don't merely prefer males; they never once mount a female, which Breedlove can only explain as aversion. He and Huberman suggest that people's aversion to same-sex sex (or opposite-sex sex) may have a biological component as well as social conditioning, though context matters (for example, same-sex sex in prisons). Huberman argues that public trust in science depends on discussing this openly.

9. There is no single cause
Breedlove emphasizes many developmental pathways to being gay or straight: prenatal testosterone appears to have a say for women, the mother's body for some men, and other factors remain unknown. He stresses that orientation is not a choice, and that a first crush typically arrives about six years after birth, long after these prenatal influences.

EXAMPLES

1. Congenital adrenal hyperplasia (CAH)
Fetuses who can't make certain adrenal steroids overproduce androgens. XX individuals may be born with intermediate genitalia. Women with CAH are more likely than average to be lesbian, though most are straight, and the share reporting same-sex orientation rises as they age. Infant 'normalizing' surgery once left some anorgasmic; after activism by Cheryl Chase and others, wait-and-see is now favoured. Huberman notes that roughly 1 in 12 people carry one CAH mutation.

2. Androgen insensitivity syndrome (AIS)
XY individuals with a nonfunctional androgen receptor develop a typical female body and are often undiagnosed until periods never start. Exams then reveal no cervix, high testosterone and internal testes. Most are straight women attracted to men, but Breedlove notes this can't separate a hormone effect from upbringing.

3. Testosterone in the adult brain
Julian Davidson's double-blind trials at Stanford in men who had lost their testes found that testosterone improved energy, libido and well-being; men 'always knew' when they were on it. Huberman relayed anecdotal reports that the steroid

trenbolone causes aggression and reversible hypersexuality in some self-identified straight men, noting these are not controlled studies.

4. A CEO with low-normal testosterone

Huberman described a successful executive with testosterone in the low 300s ng/dL who felt great on vigor, libido and enthusiasm. His advice: change nothing. Testosterone declines with age on average, but some people in their 70s and 80s have levels similar to people in their 20s.

OTHER RELEVANT

1. Don't read your own hands

Average group differences are theoretically important but have no diagnostic value for individuals. The same applies to having older brothers: most men with two older brothers are straight.

2. Judge testosterone by how you feel, not just the number

Both caution against chasing lab values when energy, libido and mood are fine. Supra-physiological steroid use is a different matter from physician-supervised replacement therapy.

3. Separate orientation from biological sex in discussions

Huberman argues that much public conflict comes from blurring orientation, biological sex and related concepts. Precise language makes the science easier to discuss.

The Best Vitality & Health Protocols | Dr. Rhonda Patrick

Guest: Dr. Rhonda Patrick
Date: 2026-03-23 · Duration: 3:31:07
URL: https://www.youtube.com/watch?v=C0DMdUqF73Q

KEYPOINTS

1. Exercise is non-negotiable hygiene: vigorous cardio plus heavy lifting
Crediting cardiologist Ben Levine with the 'hygiene' idea, Patrick trains 5–6 hours a week. Twice weekly she does 30 minutes of heavy, low-rep lifting (deadlifts, squats, cleans; about 2 minutes' rest) then 30 minutes of intervals, plus two longer HIIT sessions, 4–6 miles of running and family hikes. On busy days she does back-to-back Tabatas or 10 minutes of air squats and jumping jacks. She now works into triples and singles and still dreads them.

2. Vigorous exercise sharpens the brain in the short term
She cites findings that 10 minutes of vigorous exercise improves executive function about 14%, and a study where only HIIT (not walking or easy jogging) raised plasma serotonin, which tracked with better impulse control.

3. Train harder, worry less about protein
Patrick eats about 1.2–1.6 g of protein per kilogram of body weight, averaging around 1.3–1.4, below the popular 1 g per pound. Pushing protein higher added calories and weight for her at 47 and in perimenopause. Her view is that people should be 'more obsessed with training and less obsessed with protein,' because training drives the adaptation and protein complements it.

4. Meals briefly open the gut barrier and let bacterial LPS into the blood
The gut holds about a gram of lipopolysaccharide (LPS) from gram-negative bacteria. Tight junctions open briefly with each meal, and more so with refined sugar plus saturated fat, ultra-processed meals, big meals, or fat without a fiber matrix like butter. In human studies, gut-level doses of LPS raised TNF-alpha by up to about 50% and caused depressive feelings and social withdrawal. Patrick believes this immune activation contributes to post-meal lethargy.

5. How LPS links gut health to heart disease
LPS binds the apoB protein on LDL particles. As these particles shrink into small, dense LDL, the masked apoB can't be cleared by liver receptors, so they lodge in artery walls. Macrophages attack them as if they were bacteria and become foam cells, the start of atherosclerosis. She adds that people who don't respond to SSRIs often have high CRP, which hints at an inflammation-driven subtype of depression.

6. Stop eating three hours before bed
A recent study tracked blood pressure continuously from afternoon through the night. People who stopped eating three hours before bed had deeper nighttime drops in blood pressure and heart rate, which Patrick says translates to roughly 20% lower cardiovascular event risk. Insulin sensitivity is also lowest in the evening because rising melatonin quiets the pancreas, and Courtney Peterson's early time-restricted eating work showed blood pressure drops of about 10 mmHg.

7. Short cortisol spikes are healthy; chronic low-level elevation is the problem
Cortisol, acting through glucocorticoid and mineralocorticoid receptors, regulates about 20% of the genome. Exercise, fasting and probably cold exposure create sharp spikes that switch off. Chronic stress and sleep loss create a 'slow drip' that shifts receptor balance and causes cortisol resistance. Huberman adds that cold exposure lowers cortisol in the data, and that 'women shouldn't train fasted' distorted Stacy Sims's 'do what works for you.'

8. Visceral fat is the dangerous fat, and you can gain it without gaining weight
Waist circumference of 35 inches or more in women and 40 or more in men suggests high visceral fat. About 70% of women and 50% of men over 50 have it, and falling estrogen in perimenopause shifts fat storage toward the abdomen. Visceral fat ignores insulin's signal to stop releasing fatty acids, feeding them straight to the liver and driving insulin resistance. Patrick cites double the risk of early death and 44% higher cancer risk. In one study, five days of 1,200–1,500 extra junk-food calories made young men's brains insulin resistant and added visceral and liver fat without weight gain.

9. Aim for one 'metabolic switch' a day, through fasting or exercise
After about 11–12 hours, liver glycogen runs low and the body shifts to fat and ketones, a concept coined by Mark Mattson. Patrick fasts until about 11 a.m., often training fasted around 8:30, and stops eating around 7 p.m. She values the morning mental clarity and links it to ketones balancing glutamate with GABA. She cites Mattson's recent 5:2 study showing about 20% better cognitive test scores. Weight loss still comes down to calorie deficit, and resistance training protects muscle.

10. Ten minutes of 'exercise snacks' a day add up
In accelerometer studies of short bursts of vigorous everyday activity (VILPA), three 1–3 minute bursts a day, about 9 minutes total, were associated with 40% lower all-cause and cancer mortality and 50% lower cardiovascular mortality, even in people who don't exercise. Ten bodyweight squats every 45 minutes over a 7.5-hour workday controlled glucose better than a 30-minute walk.

EXAMPLES

1. Creatine for muscle and stressed brains
Patrick takes 10 g a day in two morning doses, up from 5 g. She points to a small German MRI study in which brain creatine rose only at about 10 g, and to studies where roughly 0.35 g/kg (about 20–25 g) restored or improved cognition during sleep deprivation and in mild cognitive impairment. She calls this early data, notes diarrhea in some people at high doses, and gives her son 2.5 g a day, citing pediatric safety and agility data.

2. Omega-3, vitamin D and lifting in a Swiss trial

Omega-3 alone slowed epigenetic aging clocks and lowered pre-frailty by about 16%. Combined with vitamin D and resistance training, aging slowed by about 3.8 months and invasive cancer risk fell 66%, though 88% of participants were already active. About 2 g a day of omega-3 usually moves a low omega-3 index to high. Huberman uses prescription Lovaza, and both take about 5,000 IU of vitamin D.

3. COSMOS multivitamin trials

In three large randomized trials, adults 65 and older taking a basic Centrum Silver showed about 2.1 years less global brain aging and 4.9 years less episodic-memory aging. Patrick takes a multivitamin and also uses a glucoraphanin (sulforaphane precursor) supplement backed by 13 studies.

4. Glutamine and NAC for run-down periods

Endurance athletes taking high-dose glutamine (around 30 g) had fewer respiratory infections. Patrick takes 5 g a day, rising to 15–20 g in 5 g doses during exposure, and admits placebo is possible. She'd avoid it with a known colon or liver tumor. She takes NAC only when sick or exposed, and away from workouts, because strong antioxidants like high-dose vitamin E and C can blunt training adaptations.

OTHER RELEVANT

1. Exercise after a bad night, but don't make it a habit

One to three nights of poor sleep can cause short-term insulin resistance. Patrick saw prediabetic glucose readings on a continuous glucose monitor as a new mother, and twice-weekly HIIT largely reversed them.

2. Pick magnesium by goal

Glycinate or bisglycinate, taken a couple of hours before bed, suits sleep. Threonate may cross into the brain better for cognition, but the evidence is mostly animal data and a small study funded by Magtein. Athletes may need up to 20% more magnesium.

3. Be cautious with BPC-157 and NAD boosters

BPC-157 has many animal studies but almost no human data, and its angiogenic effects raise a theoretical cancer concern. Huberman notices faster hair and nail growth on NMN and wonders what else it speeds up. Patrick cites a mouse study in which NMN accelerated pancreatic cancer growth.

4. Reduce microplastic exposure where you can

Washing synthetic clothing is a major microplastic source and dryer vents can blow them indoors; washing-machine filters can trap them. For heat, Patrick usually does a 20-minute sauna at about 180°F or a hot tub, five nights a week.

Unlearn Negative Thoughts & Behaviors Patterns | Dr. Alok Kanojia (Healthy Gamer)

Guest: Dr. Alok Kanojia
Date: 2026-03-02 · Duration: 3:08:43
URL: https://www.youtube.com/watch?v=9G2MRFs4vac

KEYPOINTS

1. Texting erodes the ability to read ambiguity
Kanojia says much of social life now happens over text, so the brain gets little practice reading facial expressions, and some young people feel almost autistic in person as a result. Many complain about 'mixed signals', but he argues mixed signals are normal: everyone holds ambivalence, and the back-and-forth of reading and adjusting to someone is how relationships actually work.

2. Tolerating uncertainty predicts mental health across conditions
Kanojia calls intolerance of uncertainty a factor that cuts across diagnoses: people who can sit with not knowing tend to be more resilient and have better mental health and quality of life. Demanding clear answers from every interaction, flirtation included, works against that.

3. Distress tolerance means accepting emotions, not suppressing them
Huberman worries that holding back reactions is draining. Kanojia agrees that suppression isn't the goal. Healthy distress tolerance moves the other way: you recognize and accept the feeling so you can be calm alongside it, rather than acting it out or pushing it down.

4. Naming an emotion is only the first step
When the amygdala is flooded, finding words forces it to quiet down enough for language areas to describe the feeling, which Freud recognized over a century ago. But journaling or talking about feelings is often not enough, especially for men, in Kanojia's clinical experience.

5. Resilient people deliberately add other emotions
After a breakup, for example, a resilient person remembers three good years alongside one bad one, and recognizes the experience will help them spot the next toxic relationship. This works in both directions: when you're infatuated with a person or a business idea, Kanojia suggests adding some anxiety, using the addiction-psychiatry technique of 'playing the tape through to the end'. He says he has seen more relationships ruined by falling in love than by anything else.

6. An emotion is information and motivation, not a license to act
Kanojia criticizes the online trend of 'speaking my truth' as an excuse for behaving badly. From an evolutionary view, emotions exist to inform and motivate, so feeling something doesn't oblige you to act on it.

7. Criticism hurts most where it hits an existing self-doubt
An angry attack is black-and-white and easy to dismiss, though it triggers your own amygdala and denial. A calm, precise critique works like a 'poison dart': it finds your weak point and the doubt grows. Kanojia's view is that what hurts is what you already believe about yourself. Labels like 'loser' or 'ugly' are part of the ego, which the Eastern model treats as part of a mind you can observe, like your hand.

8. Therapy and meditation reveal different things
Kanojia thinks psychotherapy gives the best insight into your own mind, while meditation is best for stepping outside the ego and quiets the brain's self-related default mode network. He notes research linking the therapeutic benefit of psychedelic sessions, mostly studied with psilocybin, to 'ego death', and suggests MDMA may also change self-perception. He adds that meditation science is in its infancy: eight-week studies teach beginners to swim and don't show what an Olympian looks like.

9. Young men who are stuck are often misdiagnosed
Many 'failure to launch' cases are gifted kids who hit a wall. Kanojia says men are taught to do, not to understand how they work, so they chase single fixes for problems that have many causes. He stresses that tiredness is a signal from the brain and doesn't always mean low energy.

EXAMPLES

1. Six months of 'that must be hard for you'
As a third-year resident, Kanojia saw a man in his 40s who had been in the clinic for eight years with depression and recounted his troubles every week. After six months Kanojia asked whether it was helping, and the man said he thought that was simply what therapy was. Kanojia calls it a light-bulb moment showing that talking about feelings alone often isn't enough.

2. His own slow launch
Kanojia took 5.5 years to finish college with a 2.4 GPA, started medical school at 28 and couldn't support himself until residency at 32. His wife, who has worked since 16, waited it out with confidence in him. What turned things around was figuring out how he works.

3. Shunya ('void') meditation
Imagine you've existed for only 10 seconds: no story, no identity, just raw experience. Everyday glimpses of this include losing yourself in a sunset or the relief of finally getting to pee. An introductory practice is to close your eyes, scan your body and look for an absence of sensation around the solar plexus while breathing. Kanojia advises approaching deeper practices with caution.

4. Erectile dysfunction in young men

Kanojia says ED in men under 30 has risen from about 5% two or three decades ago to about 20%, often meaning difficulty reaching climax during intercourse rather than getting an erection. He worries more about interactive, parasocial porn platforms such as OnlyFans than passive viewing.

5. Bedtime procrastination

Kanojia cites research separating procrastinating about going to bed from procrastinating about sleep once in bed. Falling asleep takes frontal-lobe impulse control. Once you're past your sleep window, he says, 10:30 on the phone turns into 12:30.

OTHER RELEVANT

1. Use social media carefully

Don't scroll when you feel bad: you're primed for salient content and will be 'programmed' more, and using it to regulate your mood is a big problem. Stay off it near bedtime. Remember that what you see becomes your standard; Kanojia sees body dysmorphia in men catching up with women alongside 'alpha' influencers.

2. Find your own direction rather than one set by comparison

First ask how social media has shaped what you want, then be wary of goals driven by comparison. They can bring success but not happiness: from the YouTubers he works with, he sees that one million subscribers leads to wanting two, then to fear of the creator growing faster. A real internal drive stays the same while its objects change.

3. Walk for an hour before a date

Kanojia tells patients to walk for an hour without technology before a date. His reasoning is that social media has disrupted dopamine signaling and made it neurochemically harder to feel the rush of being with someone.

Restore Youthfulness & Vitality to the Aging Brain & Body | Dr. Tony Wyss-Coray

Guest: Dr. Tony Wyss-Coray
Date: 2026-02-23 · Duration: 1:59:13
URL: https://www.youtube.com/watch?v=Ew0-Lg_Evj0

KEYPOINTS

1. Young blood can rejuvenate old tissues in mice
Wyss-Coray, a Stanford neurology professor, describes parabiosis, in which an old and a young mouse are surgically joined so their blood mixes. His colleague Tom Rando showed that young circulation restored old muscle's ability to regenerate. In their joint brain studies, old mice exposed to young blood reactivated brain stem cells, had less inflammation, showed more neural activity and, most importantly, had better memory.

2. Blood is a window into how old you are
While searching for blood signatures of Alzheimer's disease, his lab found the biggest differences in blood proteins were between young and old people. Labs can now measure about 11,000 proteins in a drop of blood, and some come from specific organs. Joining these protein measurements with large cohorts followed for decades lets researchers build 'clocks' for individual organs.

3. Organs age at different rates, and the gap predicts disease
For most people, organ ages roughly match their actual age. When one organ's estimated age runs ahead of the person's age (an 'age gap'), it strongly predicts disease in that organ. A fast-aging heart predicts heart disease, kidney predicts kidney disease and brain predicts Alzheimer's. He co-founded Vero Biosciences to offer this kind of profiling, combined with clinical and wearable data, so that fast-aging organs can be caught early.

4. Old blood both adds harmful factors and loses helpful ones
With age, inflammatory proteins rise. Knocking them out or neutralizing them improved cognition in old mice. Young blood also supplies pro-growth factors, such as GDF11, IGF-1 and Klotho, that help maintain stem cells. The challenge is finding the smallest set of factors that matters; Wyss-Coray thinks a drug might emerge in 5–10 years.

5. Exercise benefits travel through the blood
Blood from exercised young mice improved the brains of sedentary mice. His former trainee Saul Villeda found that exercised blood had an even stronger effect in old mice. Both labs traced part of the effect to factors released by the liver. Wyss-Coray's lab identified clusterin (apolipoprotein J), a complement-pathway protein, and found that injecting a synthetic version mimicked some of the benefits.

6. Plasma-based treatments look promising but aren't proven
His company Alkahest showed that young human blood had similar effects in mice, then worked with plasma maker Grifols to test fractions of pooled donor plasma in small Alzheimer's and Parkinson's trials, with promising results. A blinded, placebo-controlled Grifols trial in about 500 Alzheimer's patients that removed their plasma and replaced it with albumin showed significant benefits. A large definitive trial is still needed for FDA approval.

7. No supplement has been shown to extend human lifespan
Asked about NAD boosters like NMN, Wyss-Coray says no intervention has been validated to extend human lifespan; only exercise and diet have proven benefits. NMN supplements do raise blood levels. A Singapore researcher testing 10 NMN products found many didn't contain what the label said. Huberman takes NMN for a perceived energy boost but doesn't expect it to lengthen his life.

8. Fasting evidence in humans is weak
Calorie restriction extends life in worms and mice, partly by lowering inflammation and oxidative damage and improving energy use and cellular cleanup. But there's no agreed definition of intermittent fasting, the field is 'a mess,' some monkey studies suggest harm (such as worse kidney function), and no clinical study shows a clear benefit in humans.

EXAMPLES

1. Young spinal fluid boosted old brains
A fellow in his lab infused cerebrospinal fluid from young mice into old mice over a month. Their brains regenerated and cognition improved, and oligodendrocytes, the cells that insulate neural wiring, responded most strongly.

2. A spinal fluid ratio predicts cognitive resilience
In spinal fluid from about 3,000 people, the proteins most linked to cognition were mostly synaptic. A ratio of the top rising and top falling protein strongly separated people likely to stay sharp from those likely to decline. The ratio worsens steadily from early adulthood, independent of Alzheimer's pathology.

3. Unregulated stem cell injections can be dangerous
Huberman recounts a doctor who received stem cells injected into a spinal disc at a clinic in Mexico and developed an egg-sized infection that left him paralyzed. Wyss-Coray adds that PRP (platelet-rich plasma) concentrates wound-healing growth factors from your own blood, while exosomes are still mainly a research and diagnostic tool.

4. Growth hormone trades vitality for longevity
Hormones like growth hormone can make people feel and look younger. In general, though, higher growth hormone and IGF-1 are linked to a shorter life, a trade-off each person has to weigh.

OTHER RELEVANT

1. Lifestyle still carries the most weight

Smoking, excessive alcohol, low education, childhood obesity and poverty all raise dementia risk, and addressing them sharply lowers it. Wyss-Coray avoids drinking hot liquids from plastic. Centenarians are almost always socially connected, which may explain much of wine's reputation. Huberman's view is that zero alcohol is best, with two drinks a week as an upper limit.

2. Choose exercise you enjoy

Huberman describes a study in which a mouse forced to run whenever a partner ran developed higher blood pressure, stress markers and memory deficits, while the voluntary runner benefited. Sunlight is also linked to longer life in a large Swedish study, though outdoor activity is a confounder.

3. Aging speeds up in bursts

Aging is not linear. The conversation covers phases when it speeds up, including puberty (the fastest change of a lifetime, often within about two years), the early 40s and the early 60s, after which it slows again. That makes these periods worth watching with organ-age tracking.

4. Breathing, circulation and the aging brain

Huberman notes that practices like qigong and tai chi combine deliberate breathing with movement to improve circulation. He also points to limited data showing that people tend to become mouth breathers as their cognition declines. Whether that is a cause or a symptom is unknown.

The Most Effective Weight Training, Cardio & Nutrition for Women | Dr. Lauren Colenso-Semple

Guest: Dr. Lauren Colenso-Semple
Date: 2026-02-16 · Duration: 2:31:58
URL: https://www.youtube.com/watch?v=_Q4XT82yd-Q

KEYPOINTS

1. Muscle responds to training the same way in women and men
Colenso-Semple, an exercise scientist, says muscle protein synthesis and growth after training or protein are very similar in both sexes. Men start with more muscle because of the testosterone surge at puberty, but untrained men and women gain similar relative size once they start lifting.

2. Natural testosterone differences within the normal range don't predict gains
A man at 400 ng/dL doesn't build noticeably more muscle than one at 600 if both are within the roughly 300–900 ng/dL range, and the same holds for women. Only well-above-normal doses from steroids change the picture. Post-workout spikes in testosterone and growth hormone were once thought to drive growth, but they don't predict long-term gains, so programs built to maximize those spikes miss the point.

3. Lifting heavy won't make women bulky by accident
She credits the bikini category in bodybuilding, group fitness and CrossFit with making lifting feel feminine. Yet 'where are all of these bulky women?' Very muscular physiques take years of hard work and often drugs. Keeping teenage girls out of weight rooms is a cultural habit, not a safety issue.

4. A good beginner program trains the whole body two or three times a week
Treat lifting as a way to grow muscle, not shrink. Train all major muscle groups two or three times a week (upper/lower splits make sense at four days, more detailed splits at five or six). After warm-ups, do at least 2 hard sets per exercise, ideally 3, and up to 4, since more is probably overkill. Mix squat-type and hip-hinge movements, and progress load or reps month to month.

5. Any rep range builds muscle if you train close to failure
Stopping one or two reps short of failure is enough. Growth is similar with heavy, low-rep sets and lighter, high-rep sets, but heavy sets need many more sets to match total volume. To maximize a one-rep max, you need some very heavy, low-rep training. She is skeptical of partial reps and tempo tricks because they're hard to repeat consistently.

6. Rest about two minutes, or pair pushes with pulls
Two minutes works for most exercises and three for squats and deadlifts. Heavy one-rep-max work may need 4–5 minutes. To save time, alternate a press with a row or pull-down, which doesn't seem to hurt results.

7. Cardio rarely interferes with muscle gains
Cardio blunts muscle growth mainly with very high volume done right before lifting, so avoid sprints before leg day. If strength is the priority, lift first and separate the two by several hours. Enjoyable outdoor activity counts, and high intensity mainly saves time. Walking needn't be obsessively tracked, and the 10,000-steps figure was more or less arbitrary.

8. No need to train by menstrual cycle phase
The data don't support changing training by phase. Train hard and consistently, and adjust or skip a session if symptoms hit, but you aren't less capable during your period. Studies of combined oral contraceptives, which make up most of the research, show no effect on strength, muscle growth or power. Hormonal IUDs and patches are less studied.

9. Train the same way through perimenopause and menopause
The goals don't change: build muscle and strength, maintain bone density and reduce the risk of falls and fractures. Maintaining nerve-to-muscle connections matters too, not just hormones. A gym's circuit of machines is a good starting point for women who are nervous about the weight room.

EXAMPLES

1. Fasted training makes no difference
Long-term studies find the same muscle and fat-loss results whether people train fed or fasted. The 2012-era fasted-cardio craze didn't hold up, because extra fat burned during the workout doesn't change daily totals. The opposite fear, that fasted lifting costs muscle, also lacks support, since most lifting sessions don't drain stored carbohydrate. She trains fasted in the morning, always with caffeine, and never after 2 p.m. to protect her sleep.

2. The 'anabolic window' and the 30-gram limit
Muscle protein synthesis stays elevated for up to 24 hours after lifting, so eating protein 30 minutes or 3 hours later makes no difference. Huberman cites a study suggesting people can use up to 100 g in one sitting. She says consistent daily and weekly protein intake matters more than per-meal timing or dosing.

3. Creatine gummies often contain little creatine
When top-selling creatine gummies on Amazon were tested, some contained almost none, because the creatine is sometimes just sprayed on. She recommends 5 g a day of creatine monohydrate powder. It's safe and well studied, and the dose is the same for women. The benefit is modest: an extra rep or two, or a second off a sprint.

4. 'Cortisol belly' is mostly marketing
Real Cushing syndrome is uncommon and is usually a side effect of heavy steroid use. Its symptoms have been twisted into claims that any stress or belly fat 'must be cortisol' and that zone 2 or high-intensity training are harmful, mainly to sell

supplements that don't work. Huberman adds that stress-related eating is the overlooked factor.

OTHER RELEVANT

1. Menopause hormone therapy aims to relieve symptoms

Estrogen-based therapy aims to ease hot flashes, night sweats and poor sleep, not to restore premenopausal hormone levels. Feeling better can help women stick with training and diet. Testosterone for women is mainly proven for low libido, at low doses aiming for the low end of normal. Higher doses risk a deeper voice and unwanted hair, and there's no evidence low doses build muscle.

2. Add balance work to your strength sessions

Instead of walking in a weighted vest (no substitute for lifting) or testing grip strength, she builds balance into lifting with single-leg Romanian deadlifts, walking lunges and full-range, multi-direction movements.

3. Keep caffeine consistent

Most of caffeine's performance boost goes to people who don't normally drink it. Habitual users like her mainly notice the alertness.

How Dopamine & Serotonin Shape Decisions, Motivation & Learning | Dr. Read Montague

Guest: Dr. Read Montague
Date: 2026-02-02 · Duration: 2:41:25
URL: https://www.youtube.com/watch?v=VPi_eWiaqdg

KEYPOINTS

1. Dopamine is primarily a learning signal, not a pleasure chemical
Montague, a computational neuroscientist, says the old 'dopamine equals pleasure' view has given way to dopamine as a learning signal. Its fluctuations control learning, and it also plays roles in motivation, movement and possibly feeling states. He stresses that how dopamine's effects on learning relate to how you feel is much less well understood.

2. Dopamine encodes changes between successive predictions, not just outcome versus expectation
The 1972 Rescorla–Wagner rule compares an outcome to an expectation, but reality mostly gives long stretches with no feedback. Rich Sutton and Andy Barto's temporal difference rule learns from the gap between one prediction and the next. Using Sutton's example: on Wednesday you predict two inches of rain on Saturday, and on Thursday you update to ten inches. That change in expectation, before any outcome arrives, is what dopamine appears to encode, and the same rule lets learning chain back through cues.

3. The brain's learning algorithm is the one behind modern AI breakthroughs
Around 1990, Montague, Peter Dayan and their adviser Terry Sejnowski found that Wolfram Schultz's recordings of dopamine neurons matched Sutton's algorithm 'figure by figure'. The same temporal difference approach later underpinned DeepMind's Go programs, including AlphaGo Zero, trained from scratch without expert input. Montague calls it the only case he knows of an algorithm 'crawling out' of the brain into software that then surpasses us. It is seen in honeybees, fruit flies and songbirds as well as humans.

4. Dopamine both teaches and sets how motivated you should be
Following Todd Braver, Jonathan Cohen and Matt Botvinick, fast dopamine fluctuations carry the prediction errors that drive learning, and a slower envelope across them can indicate how much to want something. Huberman notes that infinite-scroll platforms exploit this by constantly updating expectations so you stay in foraging mode. 'Dopamine hits' are real, but Montague calls the phrase 'blunt' and incomplete.

5. Parkinson's shows dopamine's role in valuing actions
Each side of the brainstem has roughly 80,000 dopamine neurons that make hundreds of millions of connections. By the time Parkinson's symptoms appear, 70–75% are lost, so the signal becomes too noisy to read. Montague describes Parkinson's as a 'flat value function': nothing looks more valuable than anything else, and since moving costs energy, the system 'actively freezes'.

6. Dopamine and serotonin act as opponents in humans
Montague's group says it is the only one recording sub-second dopamine and serotonin levels in conscious humans, piggybacking with consent on electrodes placed in patients for surgery. In economic games, when things go well dopamine rises and serotonin falls; when they go badly the reverse happens. Serotonin seems linked to learning about negative events and to 'active waiting', and Rob Malenka's rodent work shows learning requires this opponency.

7. SSRIs may push serotonin into dopamine terminals
A roughly 20-year-old paper in Neuron (senior author John Dani) found that after weeks on an SSRI, rodents' dopamine transporters were pulling serotonin into dopamine terminals. Montague's hypothesis is that putting the 'negative juice' in 'positive' terminals could blunt reward from good events. He emphasizes that SSRIs have helped many people and are a life-changer for some, that the response is highly variable, and that human follow-up is lacking.

8. Hunger and severe stress can flip dopamine's meaning
Mark Andermann's rodent work at Harvard shows that in starvation states, dopamine in the amygdala encodes punishment prediction errors rather than reward. Montague frames this as rational in an emergency, when staying alive matters more than chasing rewards. He also cites an Israeli study showing judges' rulings varied depending on whether they had eaten.

9. Harsh feedback is a poor teacher because it causes overgeneralization
A cataclysmic negative event teaches the nervous system to fear anything resembling the context, which is the PTSD pattern. Montague argues that rulers on knuckles or very negative training of animals teach badly; small nudges work better. His abused rescue dog's world stayed 'inverted', with basic safety acting as the only reward.

EXAMPLES

1. Huberman's friend and dating as foraging
A friend repeatedly gets very excited about new matches, then wants out weeks later. Huberman describes the 'sawtooth' of updated expectations and advises collecting data more slowly, for example by seeing someone more often for two weeks before deciding.

2. ADHD-like and focused honeybees
Montague's collaborator Brian Smith at Arizona State measures neuromodulators in bees. Bees with one octopamine-to-tyramine ratio get distracted after the waggle dance and explore more; others fly straight to the nectar. Colonies need both exploration and exploitation. Montague suspects stimulants for ADHD help by stabilizing brain states and thought sequences.

3. A friend's relationship and a slowly recalibrating baseline
After brutal relationships, Huberman's friend spent about three years in a calm, healthy one feeling 'like a cat in a room full of

rocking chairs' before he could flourish. Montague agrees that the system needs sustained safety before it stops working for survival and can work for rewards again.

4. L-dopa and voices

Blocking dopamine receptors reduces schizophrenia's voices, and Montague says he could find an L-dopa dose that makes a healthy person hear voices or feel paranoid. He still calls single-chemical theories of depression and schizophrenia incomplete.

5. The phone in another room

Huberman cites a paper finding that a phone face-down on the table or in a bag still lowers cognitive performance, which recovers when the phone is in another room. He keeps social media on an old phone locked away for 22 hours a day.

OTHER RELEVANT

1. Use sports to train losing and staying calm

Montague made all five of his children do a sport. Wrestling teaches you to manage panic with your air cut off, and track meets with 60 kids in an event teach you to handle losing after doing your best. His children's school has a no-cut policy; there were 45 kids on the tennis team.

2. Learn to reward yourself for resisting

The dopamine system can make resisting feel good. Taken to an extreme, that is part of anorexia, the deadliest psychiatric illness. In healthy forms it looks like Montague relishing hill sprints while 'soft guys' slept, or Huberman finding reward in long-horizon work where the big payoffs come every couple of years.

3. Sleep resets the system

Montague sees sleep as computational cleanup: erasing, consolidating, recycling transmitters and restoring homeostasis. Two nights without it transform motivation and dopamine dynamics.

Best Ways to Build Better Habits & Break Bad Ones | James Clear

Guest: James Clear
Date: 2026-01-05 · Duration: 2:35:19
URL: https://www.youtube.com/watch?v=bdsc3Spm6Sw

KEYPOINTS

1. Mastering the start is the biggest lever in habits
Clear, author of 'Atomic Habits', says the single biggest theme he sees is mastering the first 5 minutes, or even the first 30 seconds, of choosing to start. His trainer's class had eight sign-ups on a cold, rainy day and only two showed up. The edge was simply being willing to be uncomfortable for the 5–10 minutes of getting out the door. People who dream up big plans and make starting hard tend to fail.

2. The four laws of behavior change
Make it obvious (visible, easy to notice), make it attractive, make it easy (reduce the number of steps), and make it satisfying, so the habit is tied to reward or positive emotion. Clear says his approach is 'not to prescribe but to empower': lay out the whole toolkit and let people choose the screwdriver, wrench or hammer that fits their situation.

3. Consistency is adaptability
Clear's writing habit changed shape over time. For three years he wrote 2,000-word articles twice a week at about 20 hours each. Then for three years he wrote the book. Now he writes a weekly newsletter that takes about 2 hours and reaches around 3 million readers. His rule: don't have time, do the short version; don't have energy, do the easy version. Just don't put up a zero.

4. Bad days count more than good days
A 20-minute workout of a couple of sets of squats on a bad day reinforces showing up more than a great session does. Set your baseline at what you can do on bad days and scale up on good ones. Huberman adds that chasing the perfect 'flow' state, with stimulants and focus hacks, can undermine the plain consistency that 'enlarges ability' and raises the ceiling on performance.

5. Habits are learning, so practice builds them
Both frame habits as self-directed neuroplasticity. Your brain will learn habits whether you design them or not, so the real question is whether you control which ones it learns. Huberman links Clear's examples to chunking: learn one right step, then stack the next.

6. Identity-based habits: every action is a vote
Instead of asking 'What do I want to achieve?', ask 'Who do I want to become?'. Each workout is a vote for being someone who doesn't miss workouts. Over 3–12 months, you cross an invisible threshold where the habit becomes part of your story. Then you fight to keep it: 'I run because I'm a runner, not because I have a half marathon in 3 months.'

7. Growth doesn't require self-criticism
Clear wrestled with whether you have to be dissatisfied to be driven. His image is an acorn that never berates itself for not yet being an oak and keeps growing anyway. An ex-girlfriend's advice, 'Flow, don't fight', pushed him to find versions of his work where the effort itself is the reward.

8. Never miss twice
Slipping once is a blip. The danger is letting one miss turn into three months off. Eat the pizza on day nine of a diet, then get back on track the next day. Clear mentions Gretchen Rubin's idea of splitting the day into four quarters, so a bad morning doesn't write off the whole day. Rebounding quickly beats perfect 'optimal window' thinking.

9. Bad habits run the four laws in reverse
Phones are always visible, attractive, frictionless and rewarding. That's why checking became a habit in days without any effort. Clear inverted the laws while writing the book: make bad habits invisible, unattractive, difficult and unsatisfying. Phones also blend the context for many habits on one screen, which makes them hard to separate.

10. Your social environment may matter most
If Clear could add one thing to 'Atomic Habits', it would be more on social environment. We are all in groups with shared norms, and habits that go with the grain of the group are easy to keep. You don't need to 'fire your friends'. Find or create a space where your desired behavior is normal, such as a yoga studio if no one at home does yoga.

EXAMPLES

1. Mitch's 5-minute gym rule
A reader wasn't allowed to stay at the gym longer than 5 minutes: drive there, do half an exercise, drive home. After about 6 weeks of going four days a week, he figured he might as well stay longer. Clear connects it to Ed Latimore's line: 'The heaviest weight at the gym is the front door.'

2. Phone in another room until lunch
From about 9 a.m. to noon, Clear leaves his phone down the hall. It's 30 seconds away, but he never goes to get it. He moved Audible alone to his home screen, later took email off his phone, and has used blockers like Freedom and Self-Control.

3. Two honest pages
One exercise: write the story of your past year twice, once with only the losses and once with only the wins, without lying on either. Then ask which story you'll carry. Clear replayed his best plays with his dad after every baseball season. He previews the good parts of the school day with his son before drop-off.

4. Cold-emailing 300 people

With no authors or entrepreneurs in his family, Clear cold-emailed about 300 people in his first 6 months, and about 30 agreed to chat. He later hosted gatherings of like-minded writers and found that everyone said yes because they were all waiting for someone to organize it.

OTHER RELEVANT

1. Build a bad-day version of every habit

Decide in advance the minimum version you'll do when you're short on time or energy, and treat that as success.

2. Schedule keystone habits early

The earlier in the day you do something, the better the odds it happens. Identify which hours you actually control and which habits are upstream of good days. For Clear, that is working out, reading even 5 minutes, and writing. Huberman suggests protecting 1–3 hours before sleep from heavy eating.

3. Make reaching the goal, not winning

Clear says sports taught him that 'the secret to winning is learning how to lose'. Approach new habits with curiosity, as reaching rather than pass/fail. Huberman cites choreographer Twyla Tharp: fail a lot in private so you don't fail in public. That is harder now that everything is filmed.

Master the Creative Process | Twyla Tharp

Guest: Twyla Tharp
Date: 2025-12-08 · Duration: 2:29:52
URL: https://www.youtube.com/watch?v=VnPQ4mLRG-c

KEYPOINTS

1. The 'spine' of a work is its center of focus
Tharp defines spine as focus and concentration, the center that coordinates left and right, top and bottom. Until you know where you are grounded, you are 'at sea'. Huberman likens it to a scientific paper having one main conclusion despite 50 interesting threads. Tharp points to Agatha Christie and John le Carré, who know the single conclusion from the start and whose craft lies in keeping the reader away from it for as long as possible.

2. Start with intention: why are you doing this?
She frames the creator–audience question as a spectrum from total manipulation of the audience to total disregard for it, and admits she does both depending on whom she works for. A signed contract to deliver a result is 'a sacred bond'; unpaid work frees you to pursue what you think is important. She notes artists could live cheaply in the 1960s, which shaped how freely they worked.

3. The more you know, the bigger the challenge
Tharp rejects the idea that your best work comes early, before feedback. Her example is Beethoven: he dismissed the Diabelli theme as too simple when young, returned to it about 15 years later, recognized that its simplicity was useful, and produced arguably the greatest set of keyboard variations ever written. With accomplishment come more options, so selectivity becomes essential. Early in her career she went to see everything; now she sees almost nothing, by choice.

4. Success is harder to follow than failure
After a two-year 60th-anniversary tour that was 'unfortunately very successful', Tharp faced the question 'you've done it all, now what?'. She says you cannot ask others for the answer; you have to reroute without abandoning who you are.

5. In the studio there is no good or bad, only useful
Echoing her book's advice to fail often in private, Tharp says that while working you cannot tell whether something is a failure, only whether it is exciting and generates the next question. A set schedule, including what time people arrive and what shoes to bring, makes choices for you; 'whatever' is not her favorite word. Testing ideas in real time and space 'eliminates a lot of fantasy very quickly'.

6. Work when you don't want to, or you won't be able to when you do
Asked about her years of 5 a.m. two-hour gym sessions followed by three hard-boiled eggs, Tharp says it was never a ritual and she never enjoyed it. You need a grounded instrument before you can challenge it. She traces her discipline to a mother who scheduled practice for everything and to Quaker grandparents' farms in Amish country without electricity or phones, where 'you work or you don't eat'.

7. Ritual, practice and habit are different
In Tharp's terms, ritual is done for a purpose, to accomplish an end or a kind of control. Practice is consistent ongoing activity aimed at getting the job done, whichever way works. Habit is dangerous because it must be done the same way every time. She works seven days a week ('What's a weekend?') and says honors like a Harvard honorary degree matter more to the people giving them.

8. Commitment is shown by desire, not suitability
Tharp auditions dancers but screens mainly for who wants to work with her and will 'go through the wall' when needed. She objects that dancers' pay is 'not even on the highway to the ball game' compared with athletes, and tells would-be dancers to choose something else if they possibly can, noting that the best performers often have the worst nerves.

EXAMPLES

1. The actual box
Tharp keeps a physical box for each project holding sensory objects from the moment of the first idea, such as a rock whose weight suggested a movement. She contrasts the rock, which is 'the thing itself', with a symbol. On a film script she was told to lock her first instinct in a drawer and reopen it when lost.

2. Scratching for ideas
Scratching is needed in two situations: when you are completely lost and must patiently try things in faith, and when you know where you are going but not how to get there. It means staying open and 'willing to be caught off guard', for example at a museum.

3. Baryshnikov at the barre
Tharp considers Mikhail Baryshnikov's technique the culmination of 20th-century ballet. His power came from a classical base built at the barre, which he then pushed outward with invention, making audiences feel included in his 'wideness of vision'.

4. Philip Glass and knowledge versus instinct
Huberman admits that a Glass concert around 2007–08 baffled him. Tharp contrasts her early collaboration with Glass, 'In the Upper Room', with the later 'Slacktide', performed with Third Coast Percussion, and says Huberman is confusing knowledge with instinct. They discuss protecting and refining instinct.

5. Boxing and the weight room
Tharp trained with a boxing coach because boxing's conditioning, grounding and refusal to go down exceeded dance's

demands. Huberman cautions against sparring for non-professionals. From her 50s to mid-60s she lifted in a competitive gym, reaching a deadlift personal record of 227.

OTHER RELEVANT

1. Protect a daily slot for creative work

For someone with one or two jobs and a kid, an hour and a half at, say, 6:45 a.m. 'is a lot of time'. Showing up consistently 'allows you to think that you could be a writer'. Don't expect a good day every day.

2. Move to stay young

Tharp danced hard until about 65 and describes 70 as functional and 80 as restricting. Huberman cites her idea that people age in brain and curiosity partly because they move less, which he says shows even in how much people gesture after about 40.

3. Make an exchange rate with aging

Tharp, who eats mostly simple, raw, keto-style meat, fish and vegetables, is trying to trade lost physical independence for goodwill, to accept help without shame, and to remain someone great dancers learn from. She prefers 'apprentice' to 'mentor'.

Female Hormone Health, PCOS, Endometriosis, Fertility & Breast Cancer | Dr. Thaïs Aliabadi

Guest: Dr. Thaïs Aliabadi
Date: 2025-11-24 · Duration: 3:07:28
URL: https://www.youtube.com/watch?v=hMzfGZnaPN8

KEYPOINTS

1. PCOS is common and mostly missed
Aliabadi calls polycystic ovary syndrome the most common hormone disorder in women of reproductive age. It affects about 15% of US women and more than 20% in some Middle Eastern countries. Studies say about 70% of cases go undiagnosed, and she believes over 90% are either undiagnosed or wrongly treated, often with birth control alone. About 75% of patients gain weight while 25% are lean, and she estimates 60–70% of her PCOS patients have disordered eating, which she says eating-disorder clinics often miss.

2. Diagnosis needs two of three criteria, and a normal testosterone result does not rule it out
The criteria are: signs of excess androgens (acne, oily skin, facial or body hair, male-pattern thinning); ovulation problems (cycles longer than about 35 days or roughly eight periods a year); and polycystic-appearing ovaries. That last one means 20 or more follicles in a 'string of pearls' pattern, not cysts. Since 2023 a high AMH or egg count can count as the third criterion. A normal blood testosterone does not exclude PCOS, so a daughter on spironolactone or Accutane for acne who also gets laser hair removal may already meet the criteria.

3. Four PCOS phenotypes explain why it looks different from patient to patient
Some patients have all features. Others have regular periods yet 70–80% of PCOS patients still do not ovulate, because that bleed comes from estrogen withdrawal, not ovulation. Others have no androgen symptoms at all. Lean women, women without acne, and women with regular cycles can all have PCOS, which is why Aliabadi says diagnosing it takes clinical pattern recognition.

4. Insulin resistance drives much of PCOS
About 80% of PCOS patients are insulin resistant, often from birth and including lean women. Excess ovarian androgens worsen insulin resistance. High insulin then pushes the ovaries to make more androgen, stalls ovulation, lowers sex hormone-binding globulin so free testosterone rises, and promotes visceral fat. That fat releases inflammatory cytokines, creating a self-reinforcing loop that also affects mood.

5. A high AMH can be a warning sign, not reassurance
A rough rule: each 0.1 of AMH equals about one follicle, so an AMH of 1 means about 10. Thirty follicles at age 40 suggests PCOS, which affects egg quality. At 25–28, about three eggs make one embryo; at 40 it may take 10–15, so an AMH of 0.5 could mean two or three egg-freezing cycles. She notes that 50% of US counties have no OB-GYN.

6. Treat the root causes, not just the symptoms
Birth control raises SHBG, which binds testosterone and controls acne, hair and cycles, but it is only one tool. Her approach starts with 10–15 minute walks after meals, sleep, stress reduction, an anti-inflammatory diet with less processed food, adequate protein, and resistance and high-intensity exercise. Then come insulin-sensitizing supplements (inositol, vitamin D, curcumin, chromium), metformin, and GLP-1s. Berberine she uses only in short pulses, not long term.

7. Painful periods are not normal
Pain that makes you miss school or work, cancel plans, or go to urgent care is a warning sign, as are pain with deep penetration, constant bloating, painful bowel movements, and repeated 'UTIs' with negative cultures. She says these mean endometriosis until proven otherwise. It is the top cause of chronic pelvic pain and a leading cause of infertility. She says patients often get colonoscopies or opioids like Norco and Percocet instead of a diagnosis.

8. Endometriosis is often missed on imaging and in surgery
A normal ultrasound or MRI does not rule it out, though an endometrioma ('chocolate cyst') shows up immediately and signals roughly stage 3 disease. Laparoscopic excision, cutting lesions out rather than burning them, is the gold standard for diagnosis but not the first treatment. She says only about 1 in 100 gynecologists is trained to do it well. Stromal endometriosis appears as thin fibrous lines rather than dark spots and can take her 15 minutes to find.

9. Endometriosis can take eggs early
Inflammation damages egg count and quality, scars the fallopian tubes, and makes the pelvis hostile to sperm and embryos, raising the risk of ectopic pregnancy and miscarriage. She has seen 30-year-olds with almost no eggs and 14-year-olds with the egg count of a 40-year-old. She estimates more than 20% of women have endometriosis and that about half of PCOS patients have it too, possibly fueled by PCOS-related inflammation, though she calls this her own hypothesis.

EXAMPLES

1. Metformin dosing
For PCOS she starts 750 mg at night, adds 750 mg in the morning if tolerated, and may go to 1,000 mg twice daily. She says 500 mg once a day 'won't touch' these patients. Nausea and diarrhea are the main side effects. For lean people with borderline HbA1c she starts at 500 mg. Her own HbA1c fell from 5.6 to 4.8 on metformin.

2. GLP-1s since 2014
A cardiologist colleague suggested Trulicity for her overweight PCOS patients with high triglycerides. Patients lost large amounts of weight, their periods became more regular, and they reported feeling 'less inflamed.' Her clinic average is about 24 pounds over four months. She avoids starting GLP-1s and metformin at the same time because both cause nausea.

3. Hormonal suppression for endometriosis

Implants grow with estrogen and slow with progesterone. She uses progestin-only pills such as Slynd, which also counters androgens in PCOS, or the smaller Kyleena IUD in young patients with mood issues, because the effect stays local to the pelvis. She checks egg count first and sends low-count teens to freeze eggs.

4. Her own mastectomy

At 48, with no family history or mutation and no risk factors, a biopsy showed atypia. Her calculated lifetime breast cancer risk was 37%. Doctors called her paranoid, but she found a surgeon willing to perform a preventive double mastectomy. She notes 85% of women diagnosed have no family history and fewer than 5% carry a mutation.

5. The 'exaggerate by 50%' advice

A physical therapist told his daughter to overstate her pain so doctors would act. Aliabadi says instead to ask your doctor directly for a pelvic ultrasound and an AMH test.

OTHER RELEVANT

1. Get an AMH baseline

Get a baseline by 18 even without symptoms, earlier with painful periods. Remember that a high count and regular bleeding do not guarantee normal reproductive function.

2. Calculate your lifetime breast cancer risk

Use the Tyrer-Cuzick model. The average US woman's risk is about 12.5%. At 20% or more, ask for imaging such as MRI alternating with mammogram and ultrasound every 6 months, whatever your age, and discuss tamoxifen, which roughly halves 10-year risk, or surgery. With a family history of cancer, ask about genetic testing.

3. Act early on both conditions

The habits to start now: post-meal walks, sleep, stress control, less processed food, adequate protein, resistance training. Bring written questions to appointments, and see another doctor if you are dismissed.

How to Speak Clearly & With Confidence | Matt Abrahams

Guest: Matt Abrahams
Date: 2025-11-17 · Duration: 2:26:21
URL: https://www.youtube.com/watch?v=ZtTUfMHuioA

KEYPOINTS

1. Fear of public speaking is fear of losing status
Abrahams, who teaches communication at Stanford, explains the fear in evolutionary terms. When humans lived in groups of about 150, relative status determined access to food, shelter and mates, so anything that put status at risk felt dangerous. That same sensitivity fires whether you're facing a big crowd or raising a hard issue with your boss.

2. Open with something engaging, not your résumé
He's on a 'personal mission' to stop talks and meetings from starting with titles. Start the way an action movie does: with a provocative statement, a question or a striking statistic that shows why the topic matters to the audience. He distinguishes 'career and college credibility' (your LinkedIn profile) from 'Costco credibility', which you earn like a free sample, through relevant questions and engagement.

3. Authenticity starts with knowing what you stand for
For Abrahams, authenticity isn't a technique you switch on. It means reflecting first on what matters to you, then expressing it clearly for the audience. Speakers who rush to get through all their material lose that grounded, connected place.

4. Judging yourself while you speak uses up mental bandwidth
Constantly tracking how you're doing takes attention away from the listener. The same logic explains why memorizing a talk backfires: the effort of recalling exact words gets in the way of the communication itself.

5. Success means the audience understood, not that you got it all out
He calls fidelity 'the F word of all communication': accuracy and clarity in getting ideas across. Most people write one message and deliver it to every audience. Instead, do 'reconnaissance, reflection and research' on what this particular audience needs, and watch for confused or upset faces so you can adjust in the moment.

6. Structure beats lists
Brains handle stories with a beginning, middle and end far better than litanies. Abrahams can only remember about three grocery items without writing them down, and he jokes that 'bullets kill'. Useful templates include problem–solution–benefit (the structure of most ads); past–present–future; and what–so what–now what.

7. Act like a tour guide
Set expectations up front about where you're going and what you'll skip, and signal each move to the next point. Within that frame, side trips are fine. For teaching, he says the evidence favors a linear, scaffolded approach.

8. Improve through repetition, reflection and feedback
'Nobody has ever thought their way to better communication.' Rehearse out loud and anticipate responses. He's surprised by executives who flip through their slides once or twice and call it practice, when performers rehearse routines over and over.

9. Manage both the symptoms and the sources of anxiety
For symptoms, Huberman recommends extended exhales, which slow the heart through the vagus nerve, and Abrahams now teaches the 'rule of lung': make your exhale longer than your inhale. For sources such as fear of a bad outcome, get present-focused: count backwards from 100 by 17s, listen to a focusing playlist or say a tongue twister three times fast.

EXAMPLES

1. The 'call it something it's not' exercise
On day one, students spend 15 seconds pointing at objects and calling them the wrong name. One student froze because calling a chair a 'cat' wasn't 'wrong enough': both have four legs, and cats sit on chairs. Abrahams uses it to show how much judgment we carry around.

2. Composure during a Stanford job talk
Huberman recalls Mark Ziolkowski spilling water onto his laptop mid-talk. Without comment, he capped the bottle, asked for a towel, dried the laptop and finished. Abrahams uses it to make the case for contingency planning, much as you'd plan for a delayed flight.

3. Watch your talk three times
Abrahams' students record every presentation and review it once with sound only, once with video only and once with both, noticing different things each time. He compares it to the dentist: nobody likes going, but everybody's glad they went.

4. One minute a night, five minutes on Sunday
For years he has written down what went well and badly in his communication each night. On Sundays he spends five minutes reviewing the week and planning the next. He credits the habit with making him a better communicator.

5. Landing phrases to cut filler words
From coach Jerry Weissman: finish each phrase with your breath fully out, so you have to inhale, and you can't say 'um' while inhaling. Practice by reading your daily calendar aloud and landing each item. Abrahams notes that fillers signal something important is coming, which is why constant 'ums' grate, so the goal is to make them less distracting rather than eliminate them.

OTHER RELEVANT

1. If you blank out

Don't memorize. Remind yourself the odds are about 80% you won't blank, and that the worst case is only embarrassing. If it happens, repeat your last point to retrace your steps, or ask the audience a reflective question to buy time. Say 'I get so passionate I get ahead of myself' rather than apologizing, and never announce that you're nervous.

2. A short prep checklist

Ask who the audience is and what matters to them, watching for the curse of knowledge and passion. Set a goal covering what you want them to know, feel and do. Choose a structure, then practice out loud.

3. Use paraphrasing to regain control

Paraphrasing an interrupter or rambler ('Cost is really important, and we'll cover it next') takes the floor back politely. Letting them run on is ruder to everyone else in the room.

4. Stick to your normal routine before a big talk

Introduce yourself by leading with something you care about, then your name. Hold something cold before speaking to reduce blushing and sweating, since your palms help regulate body temperature. Keep caffeine at its usual level, as extra caffeine after a bad night can agitate you. Abrahams, who takes beta-blockers for a heart condition, finds they make him foggy and discourages using them just for nerves.

How A Doctor Cured His Own Terminal Disease | Dr. David Fajgenbaum

Guest: Dr. David Fajgenbaum
Date: 2025-11-03 · Duration: 1:58:54
URL: https://www.youtube.com/watch?v=PCbD3hFyfCk

KEYPOINTS

1. Many treatments may already be sitting on pharmacy shelves
Dr. David Fajgenbaum, a physician at the University of Pennsylvania and co-founder of the nonprofit Every Cure, notes there are about 4,000 FDA-approved drugs for roughly 4,000 diseases, while about 14,000 diseases have no approved treatment. Since a typical small-molecule drug binds 20 to 30 different proteins, many drugs likely have uses beyond their label. The system, he says, is not set up to find new uses for old medicines.

2. Generic drugs lose their champions
About 80% of approved drugs are generic. Once a patent expires, many manufacturers sell the same drug for pennies, so no one funds trials, pushes new uses into guidelines or educates doctors. Companies near a patent cliff usually tweak dose or formulation for the same disease rather than pursue a new one. Fajgenbaum stresses this is not a conspiracy; the incentives simply are not there.

3. Cheap drugs with striking new evidence
Aspirin has been shown to reduce colon cancer recurrence, particularly in tumors with a mutation in the mTOR pathway, yet many eligible patients do not take it. A trial in India of about 1,600 women with localized breast cancer, published in the Journal of Clinical Oncology, found lidocaine injected around the tumor shortly before surgery was associated with 29% lower five-year mortality. Every Cure is still reviewing the mechanism and evidence before advocating for it.

4. The same mechanism can harm and heal
Thalidomide caused devastating birth defects by blocking blood vessel growth. That same anti-angiogenic effect later earned approval for leprosy and multiple myeloma, saving thousands of lives. Sildenafil (Viagra) went from heart disease to erectile dysfunction to a rare pediatric lung disease. Colchicine, an ancient gout remedy, won approval at an adjusted dose to reduce heart attack risk in people who had already had one, particularly those with diabetes.

5. Knowledge exists somewhere but fails to spread
In DADA2, a genetic condition causing dozens of strokes from birth, a doctor around 20 years ago tried a leftover TNF inhibitor in one child and the strokes stopped. The finding spread slowly for about a decade until Chip Chambers, a physician whose two children were born with DADA2, helped gather data and guidelines. Fajgenbaum calls it a travesty: someone knew, but the world did not.

6. How to advocate for yourself with a serious illness
First, connect with the disease organization for your condition, such as the ALS Association or the Michael J. Fox Foundation, which often hear what is being tried worldwide. Second, find the world's leading expert and travel to them if you can. Third, keep asking questions, including whether anything else is being used elsewhere. Doctors read the literature in piecemeal ways and cannot keep up with millions of papers.

7. He found his own treatment through repurposing
As a third-year medical student, Fajgenbaum developed idiopathic multicentric Castleman disease, a cytokine storm that shut down his liver, kidneys and bone marrow. He nearly died five times. Seven-drug chemotherapy repeatedly saved him but did not hold. Testing his own blood and lymph node tissue, he found the mTOR pathway in overdrive and proposed sirolimus (rapamycin), a transplant drug never used for Castleman. He has been in remission for nearly 12 years.

8. Breadcrumbs in published research can save lives
In 2016 a man with metastatic angiosarcoma had been told he was out of options. A PubMed search turned up a 2013 paper showing four of five tumors expressed PD-L1. Treated with a PD-1 inhibitor, he has been in remission for nine years; the approach now helps about 18% of patients with a cancer once fatal within a year.

9. Every Cure uses AI to rank drug-disease matches
His lab's work has found 14 drugs for diseases they were not designed for. Every Cure scans all drugs against all diseases. Its top-ranked option for Castleman, the TNF inhibitor adalimumab, helped a patient who had failed other treatments; the case was published in the New England Journal of Medicine. A physician and patient must still make each treatment decision.

EXAMPLES

1. Tocilizumab's long road
Kazuyoshi Yoshizaki developed tocilizumab for Castleman disease in Japan, reportedly receiving the first dose himself. It was later approved in the US for rheumatoid arthritis, yet Fajgenbaum's doctors did not think to try it. It works in about a third of patients and did not work for him.

2. More Castleman patients helped
Sirolimus helped other patients, including a boy named Joey, now in college at Temple. A girl named Kayla who did not respond to sirolimus improved on ruxolitinib, a myelofibrosis drug, and is now studying nursing at Marquette.

3. POEMS syndrome
A man about to be taken off life support was treated with three multiple myeloma drugs, based on the close similarity between the conditions. He has been in remission more than a year and a half.

4. DFMO for Bachmann-Bupp syndrome
Children with this rare syndrome have excess ODC1 activity and are often tube-fed and bed-bound. DFMO, developed for

African sleeping sickness, binds the enzyme; started early, some children come off feeding tubes and can sit up.

OTHER RELEVANT

1. Sleep loss and the immune system

Fajgenbaum cites a mouse study in which severe sleep deprivation killed animals through a cytokine storm involving interleukin-6, and blocking cytokines extended survival. In people with autoimmune disease, stress is strongly linked to flares.

2. Be skeptical of rapamycin for longevity

He takes a transplant-level dose for his disease but says lifespan gains in caged lab animals may not translate to people exposed to pathogens, given the drug's potent immunosuppression.

3. Hope, action, impact

Taking action creates impact, which fuels hope and more action. Huberman links this to Josef Parvizi's finding that stimulating the anterior midcingulate cortex makes patients want to lean into a challenge.

4. Preventive uses need rigor too

On GLP-1 drugs and emerging links to Parkinson's, Alzheimer's and breast cancer risk, and on nicotine or lithium for brain health, Fajgenbaum urges caution: individual anecdotes cannot show cause.

Improve Your Lymphatic System for Overall Health & Appearance

Date: 2025-10-27 · Duration: 1:39:47
URL: https://www.youtube.com/watch?v=KBkl3I645c8

KEYPOINTS

1. The lymphatic system is the body's second circulation and waste-removal route
Blood delivers oxygen and nutrients, but some fluid leaks into the interstitial space between cells along with waste such as proteins, ammonia and carbon dioxide. Lymphatic vessels collect roughly 3–4 liters of this excess fluid and return it to the blood. Huberman opens with three conclusions: the system is essential to short- and long-term health, it's under-appreciated next to the heart, brain and microbiome, and it gets a 'woo' reputation from practices like rebounding that actually have a sound basis.

2. Lymph drains back into the blood near the collarbones
Superficial lymphatic capillaries sit just under the skin. Deeper vessels run with the fascia around muscles, so ordinary movement like walking pushes lymph upward against gravity. The fluid eventually re-enters the venous blood through two ducts, the right lymphatic duct and the thoracic duct, near where the neck meets the chest. That's why so many drainage protocols focus on the clavicle region.

3. Lymph nodes are immune checkpoints, so don't squeeze them
Nodes under the jaw, in the armpits and in the groin are where T cells, B cells and other white blood cells inspect lymph for bacteria and viruses. Swollen or sore nodes, when not explained by a hard workout or short sleep, can mean you're fighting something or about to get sick. A sore node in one armpit doesn't necessarily mean a problem in that arm. Massage professionals told Huberman that pressing directly on nodes is generally a bad idea, since lymph needs time there to be surveilled.

4. Diaphragmatic breathing pumps lymph
Belly breathing, where the diaphragm descends and the belly moves out, creates pressure changes that move lymph from vessels back into the blood. Huberman suggests two or three deep belly breaths on waking, again in the afternoon or evening, and whenever you remember. This is especially useful when stuck at a desk or on a plane, where the usual muscle-pump effect is missing.

5. Bouncing, treading water and swimming work, for mechanical reasons
Huberman jumps on a small trampoline in the mornings. Jumping might seem to push fluid downward, but he compares it to tamping down a slurpee: clearing space in vessels lets fluid from elsewhere move in. Swimming and treading water are among the best options because water creates a rippling shear along the skin that squeezes the superficial lymph capillaries.

6. Lymphedema ranges from invisible to permanent
Lymphedema is common after cancer treatment, when lymph nodes are removed or destroyed to limit metastasis. It's staged one to four. Stage 1 has abnormal flow without visible swelling. In stage 2, swelling such as puffy ankles resolves after 20–30 minutes with the legs elevated. Stages 3 and 4 involve more permanent buildup. For milder leg heaviness or soreness, light swimming, treading water, walking, leg elevation or pneumatic compression boots help move fluid.

7. The brain has a glymphatic system that runs mainly during sleep
Until 2012, scientists believed the brain lacked lymphatic clearance. Then Maiken Nedergaard, who studies glial cells, showed that during sleep the perivascular spaces around brain blood vessels expand by about 60%, letting cerebrospinal fluid flush waste away. Poor glymphatic clearance helps explain brain fog and morning facial puffiness. Huberman cites a mouse study of Alzheimer's disease in which aerobic exercise improved lymphatic clearance of amyloid beta.

8. Side sleeping and slight elevation may aid nighttime clearance
All mammals put their heads down to sleep. Though systematic human studies are limited, side sleeping appears best for lymphatic drainage, and left versus right doesn't seem to matter. Some sleep studies have people wear a pack on their back to prevent rolling over. Huberman also suggests elevating the feet about 5–10 degrees with a pillow, using a pillow that keeps the head from tilting down, and keeping the room cool. He has started making an effort to sleep on his side himself.

9. Cardio grows lymphatic vessels in the heart
Heart cells work constantly and generate a lot of waste, and clearance declines with age. Cardiovascular exercise drives lymphangiogenesis, the growth of new lymphatic vessels serving the heart. Huberman calls this a major reason aerobic exercise supports heart and brain health and longevity.

EXAMPLES

1. The scientist who was dismissed
Before 2012, a researcher saw injected dye travel along brain perivascular spaces. Two larger, famous groups failed to replicate her finding because they left a hole in the skull while imaging, which released the pressure lymph needs to move. She left the field, later funded work at the NIH that helped confirm brain lymphatics, and illustrates Huberman's point that a failure to observe something doesn't prove it isn't there.

2. Puffiness after deep-tissue massage
Deep-tissue massage can push lymph through the nodes earlier than normal and trigger a minor inflammatory response, which shows up as facial puffiness. It usually resolves within a couple of hours of walking around.

3. Fascial and lymphatic face massage
Huberman points to Instagram creator Anastasia Beauty Fascia (no financial ties) for non-surgical face routines, with striking before-and-after photos over 2–60 days. He says the order and pressure matter because the lymph capillaries around the

eyes are tiny and easy to pinch shut. Dermatologists told him under-eye patches likely work simply by applying gentle pressure that moves lymph out of the area; the added peptides and collagen are unnecessary.

4. Morning face versus a few hours later

Many people wake with bags under their eyes and look older, then look fresh a couple of hours later without any cosmetics. Huberman attributes this to lymph and glymphatic fluid clearing once they're upright and moving, and notes it's worse after poor sleep.

OTHER RELEVANT

1. Daily lymph routine

Move throughout the day, take a few deep belly breaths several times a day, and add rebounding, swimming or treading water when possible. Get regular cardio, timed early enough not to disrupt sleep.

2. Hydrate

Lymph is fluid-based, which gives another reason to stay well hydrated alongside regular cardio and resistance training.

3. Use long-wavelength light

Red, near-infrared and infrared light (roughly 620–1,000 nm, with devices usually 620–850 nm), or low-angle sunlight near sunrise or sunset, appears to improve mitochondrial function, blood flow and lymphatic function in skin. Studies show reduced inflammation and acne, better wound healing, and reduced lymphedema in breast-cancer patients.

4. Protect sleep for brain clearance

Everything that improves sleep also improves glymphatic clearance. Try side sleeping, slightly elevated feet and a cool room.

How to Overcome Inner Resistance | Steven Pressfield

Guest: Steven Pressfield
Date: 2025-10-20 · Duration: 2:15:02
URL: https://www.youtube.com/watch?v=cpKsogGdem4

KEYPOINTS

1. Resistance grows with the importance of the work
Pressfield stands by the line 'The more important to your soul's growth, the stronger the resistance will be.' When you conceive a book, film or business, you don't get a surge of inspiration. You get waves of Resistance with a capital R: procrastination, distraction, the urge to go to the beach. The resistance tracks how much the work matters to your evolution, not its commercial value. If you're torn between three or four projects, he says to do the one you're most afraid of.

2. The tree and its shadow
His image: a tree appears in a sunny meadow and immediately casts a shadow. The tree is your dream and the shadow is the resistance, and the two are directly proportional. So a massive feeling of 'I'm not good enough, I want to quit' is a good sign: it tells you the tree is big. Choose the big tree, not the little one.

3. Train the body as a rehearsal for the work
At 82, Pressfield arrives at the gym at 4:45 a.m. To him the gym is less about fitness than about rehearsing resistance. He hates getting up that early, it will hurt, and he's afraid of injury and embarrassment. Facing that first means that by the time he sits at the keyboard, nothing else that day feels as hard. On the Sundays he skips, he notes, he doesn't feel good about himself.

4. Bank 'little successes' and capture ideas immediately
He cites Braveheart screenwriter Randall Wallace, who stacks small morning wins to build momentum before writing. Both men agree that ideas arriving during workouts vanish 'like a dream'. Pressfield dictates them into his phone right away, and Huberman avoids social media and texting during training so those ideas can surface.

5. Dive straight in, and don't judge the day's pages
Asked how often his mind drifts to the news in the first ten minutes of writing, Pressfield says never, although it took years to get there. He plunges in, writes about an hour, takes a laundry break, and writes another hour. His inner critic almost never appears now. He never rereads the day's work, telling himself that quality will come in later drafts.

6. Think in multiple drafts
Top Gun's original writer, Jack Epps, taught him to 'always think in multiple drafts': you can only fix one thing per draft. Pressfield takes a book through 13–15 drafts, the last seven or eight with only slight changes, which frees each day's session from perfectionism.

7. Stop at the point of diminishing returns
He once wrote four hours a day and now writes about two, which he believes produce as much. When typos and mistakes appear he stops without guilt, as with an extra gym set that will only hurt you. He quotes Steinbeck that squeezing out a little more at the end of a long day is 'the falsest kind of economy' because you pay for it the next day. He also follows Hemingway's habit of stopping when he knows what comes next, which eases the next morning's entry. Huberman adds that resistance-training data favor the intensity of the first one or two hard sets, as the nervous system gets better at recruiting effort.

8. A sealed work environment
There's no internet, music or phone use beyond dictating a note. Sessions are usually 11 a.m.–1 p.m. and shift by two hours at most. His chair isn't comfortable, and he thinks it shouldn't be. Huberman calls a famous writer's advice to buy a super-comfortable chair 'terrible', arguing that a focus on optimizing comfort is itself a trap, and points out that his podcast started in a closet.

9. Turn pro
Pressfield's breakthrough was flipping from amateur to professional thinking. A pro shows up every day, stays all day or its equivalent, plays hurt like Jordan or Kobe Bryant, and doesn't take success or failure personally. An amateur folds at adversity and checks how they feel. A professional does it anyway.

10. The people closest to you may resist your calling
Most people have a calling they aren't pursuing, he says, so your effort can feel like a reproach to them: 'If Andrew can do it, why can't I?' That can lead to undermining framed as concern, such as 'we don't want your children starving.' Huberman adds that people mock those who eat well or sleep early because it highlights their own choices. He also names anger and numbing out, through certain social media, news, alcohol and ultra-palatable food, as resistance sold to us 'for free', paid for with our time.

EXAMPLES

1. The invocation of the Muse
Pressfield's mentor Paul Rink, who knew Steinbeck and Henry Miller, typed out the invocation of the Muse from T.E. Lawrence's translation of the Odyssey on a Remington manual typewriter. Pressfield recited it aloud every morning for about 50 years. The page was lost when his house burned in the recent fires (he and Huberman were neighbors, and both their homes were lost), but he knows it by heart. He believes ideas come from 'someplace else' and the artist's job is to get out of the way.

2. 'You're a professional'

As a new truck driver in North Carolina, Pressfield dropped a trailer carrying about $300,000 of industrial equipment. His boss Hugh Reeves took him to a Durham hot dog place and told him that whatever internal drama he was going through, his job was to deliver the load.

3. 'Pulling the pin'

Picking fruit in Washington State to fund a book, Pressfield learned the fruit tramps' phrase for quitting too soon, taken from uncoupling railcars. He realized he'd pulled the pin on everything, including his marriage. A fellow picker and Korean War Marine named John wouldn't let him quit before the season ended.

4. A brutal first review

The first film he worked on, a King Kong movie, drew a Daily Variety review that said it hoped the writers' names weren't real 'for their parents' sake'. He never rewatched it. His friend Tony Keelman told him he was 'in the arena'. Rink's advice was to start the next one today. The War of Art and Gates of Fire each took years to find readers, and he published his first book at 52.

5. Honor as fuel

His family was the struggling branch among successful relatives, and proving them wrong to honor his father drove him more than thoughts of mortality. His former advertising boss Phil Slott told him life is long, not short, so at 82 he plans as if he has a 20-year career left.

OTHER RELEVANT

1. Pick the project you fear most

Use the size of your resistance as the guide to which work matters.

2. Expect an unbalanced life

Pressfield says pursuing a calling 'with both feet' cost him things, including not having children. He doesn't regret it, quoting The Godfather Part II: 'This is the life we've chosen.'

3. Further reading

Huberman recommends The War of Art, Do the Work and Gates of Fire. Pressfield's next novel, The Arcadian, due next June, follows the final life of his recurring soldier Telamon of Arcadia from A Man at Arms.

How to Make Yourself Unbreakable | DJ Shipley

Guest: DJ Shipley
Date: 2025-10-06 · Duration: 3:42:36
URL: https://www.youtube.com/watch?v=WwRc2SEo-VI

KEYPOINTS

1. Mental health often follows physical capacity
Shipley, a retired Tier 1 Navy SEAL, says his lowest points came when injuries and surgeries cut him off from training. As strength coaches rebuilt him physically, his mental health 'naturally' recovered. He frames his training as being for the group: once the team, now his family.

2. Stack 'micro-wins' with a fixed morning sequence that starts the night before
Clothes laid out, water bottle filled, pills and toothbrush ready. His alarm goes off at 5 a.m. whenever he went to bed, even after landing on a red-eye at 2:30 a.m. He then follows the same order every day: unplug the phone, brush his teeth, take his pills, dress left sock then right. By his first cup of coffee he has done about 25 things within his control, so nothing feels frantic.

3. Structure exists because things can knock you off course
Huberman points out that operators build routines not because they are unflappable, but because they know they are context-dependent. Shipley guards his 7 a.m. workout ('unracking at 0700') against chats and drop-ins because he knows how missing it cascades through his day. He says he has rarely taken five days off in 20 years for fear his mental health would drop.

4. Compartmentalize with deliberate transitions
From 5 to 10 a.m. he is 'selfish' to be selfless later. From 10 to 6 he thinks only about work. On the 12-minute drive home he puts the phone on do not disturb, plays calming music (Chris Stapleton), and rehearses greeting each daughter and his wife. He reminds himself he has only about three hours to be a full-time dad and husband, and will 'fake it' if needed so the first interaction is positive.

5. Know the difference between hurt and injured
Training for decades builds body awareness precise enough to tell a doctor exactly where a problem is. Huberman describes carrying Cam Hanes's 72-lb rock up 1,000 feet with a strained hamstring: it hurt, but it wasn't an injury, and knowing that line is what keeps you from losing months to a real injury.

6. BUD/S selects for tolerating misery, not for looking the part
Shipley says he arrived as a 6'1", 145-lb skateboarder who barely passed screening, alongside 'freaks' like Coleman Ruiz. Of more than 200 in his class, fewer than 20 graduated. Physically impressive candidates often quit in the cold surf, while less-fit men who simply didn't care how miserable it was made it. His frame: 'You bought the ticket, you get the whole show.'

7. Ibogaine and 5-MeO-DMT broke a cycle nothing else touched, in his telling
After a skydiving injury, an electrocution, medical retirement, up to 60 pills a day and being suicidal, Shipley followed Marcus and Amber Capone (Veteran Solutions) to a supervised clinic in Mexico. He says none of his four ibogaine sessions brought up combat. Instead they replayed his childhood, then put him in his family's position, including feeling his seven-year-old's fear of him. His final 5-MeO-DMT session produced what he calls ego death, followed by love and clarity.

8. Huberman's caveats on psychedelic treatment
These treatments are not legal in the U.S., require medical supervision, and Huberman says there is no reasonable or safe recreational use of them. He frames them as tools for brain plasticity, notes that Stanford's Dr. Nolan Williams is scanning veterans who undergo them, and describes a bipartisan push, including former Texas governor Rick Perry, toward FDA approval. Shipley stresses that the medicine is 'not a cure-all': you must restructure your life afterward.

9. 'Dials, not switches'
Shipley says he could have done the SEAL job and still been a full-time father if he had learned to turn his operator mode up and down gradually rather than flipping it on and off. His fear before treatment, shared by many operators, was losing his edge. He says the medicine instead improved his ability to move between roles.

EXAMPLES

1. The nightly 20-minute walk with his wife
Every night after dinner, rain or shine except a downpour, they walk about a mile with no phones: she talks for the first 10 minutes and he talks for the second. He credits it with the best his marriage and health have been. Huberman adds that a consistent wake time supports sleep rhythms and growth hormone release.

2. Rebuilding a pull-up after shoulder surgery
After a dislocation that 'came through my armpit', 31 days of inpatient rehab and a drop from about 215 to 180 lb, Shipley refused to hang from a bar. Coach Vernon Griffith held his knees and lowered him gradually over weeks, then progressed to a band and to free hangs. At 215 lb he now does sets of 20–25 strict pull-ups.

3. A five-day training week
Monday is a pull day with trap-bar deadlifts, pull-ups and grip work. Tuesday is heavy pressing. Wednesday covers rotation and anti-rotation work, plyometrics, carries and short sprints at the start. Thursday is a 'brutal' leg day with a belt squat and heavy lunges and split squats. Friday is arms and accessories. Sprints of 200–300 m go at the end two or three days a week, since running them first 'zaps' the lift.

4. His all-round fitness test
The tiers include a broad jump (minimum your height, 'standard' about 8 ft, his goal 10 ft); bodyweight bench press reps

(10/15/20+); strict pull-ups (10/15/20+); a farmer's carry with half your bodyweight in each hand; trap-bar deadlift sets of five from 1.5× bodyweight upward; an 800 m run; and a plank (2, 2.5 or 3 minutes).

5. Coming home after treatment

He confessed past wrongs to his wife expecting to lose her. Instead she took off his sunglasses and collapsed into his arms. He now hosts groups going for treatment, including veterans, pilots and civilians.

OTHER RELEVANT

1. Try two 20-minute walks a day for a week

Shipley's challenge is a walk in the morning before the kids are up and another after dinner, for seven days. He says the world won't fall apart on day eight.

2. Mind your intake, not just your food

Following Griffith, he treats what you see and hear, from scrolling to music choice, as part of your diet, and keeps the phone out of his training and family blocks.

3. Test yourself regularly

He suggests retesting about every three weeks. A drop in performance is a cue to check sleep, nutrition and workload before pushing harder.

Enhance Your Learning Speed & Health Using Neuroscience Based Protocols | Dr. Poppy Crum

Guest: Dr. Poppy Crum
Date: 2025-09-29 · Duration: 2:35:50
URL: https://www.youtube.com/watch?v=MlmFj1-mOtg

KEYPOINTS

1. Every technology you use is reshaping your brain maps
Crum, a Stanford neuroscientist and former chief scientist at Dolby Laboratories, argues we are more plastic than we realize, and that the statistics of our environments and tools allocate our limited neurons. As we age, that shaping depends increasingly on how attentive and engaged we are rather than on passive consumption.

2. The textbook homunculus is out of date
Wilder Penfield's 1940s map came from stimulating the cortex of awake epilepsy patients and asking what they felt. Crum asks students what is wrong with it today: thumbs should be bigger because of phones, and ankle representation may shift as driving changes. The map reflects how the brain allocates resources for success in a given era. Texting did not build a new brain area; it reallocated existing ones.

3. Your environment sets your sensory thresholds
Cities have sonic imprints from their vehicles, density and construction, so hearing thresholds and sensitivities can partly predict where someone lives or grew up. Sounds that mattered in childhood, such as a neighbor's rooster, become deeply embedded.

4. Perception is sensory input filtered through priors
We combine sensory data, accumulated statistics called Bayesian priors, and expectations, so people experience the same physical information differently. Crum's two-and-a-half-year-old daughter, seeing NASA's image of Earth in a Smithsonian planetarium, shouted 'Minions!' because her prior for that image was the Universal logo. Speed at probabilistic inference is a strong predictor of success in many environments.

5. Closed-loop feedback accelerates skill learning
Video games give real-time performance data in a controlled, closed loop, which is why Crum teaches a Stanford course on neuroplasticity and video gaming to musicians, computer scientists and athletes. Real-time feedback, including auditory feedback, sharpens neural representations so you can detect finer differences.

6. Ask whether a tool makes you smarter or just faster
Crum sorts tool use into two bins: using technology to gain insight and become cognitively or physically more effective, or using it to replace a cognitive skill for speed. GPS is a replacing tool. London taxi drivers once had more hippocampal gray matter from mental maps; without GPS today, do not expect the same navigation ability. Huberman's worry is that time saved gets filled with things that are neutral to harmful.

7. Writing with LLMs cuts the load that builds learning
Cognitive load theory splits effort into intrinsic load from difficult material, extraneous load from poor presentation or a noisy setting, and germane load spent building mental schemas. Germane load is the work of learning. In an MIT EEG study comparing essays written with brain only, search engines or LLMs, the LLM condition reduced engagement and transfer. Crum predicts professionals who learned their field before LLMs will be better at extrapolation and spotting patterns.

8. Your body broadcasts your state
Breath carries a shifting mix of CO2, acetone and isoprene that changes with stress or suspense. Pupil size tracks arousal and cognitive load and is now measurable with open-source software on laptops or phones. Huberman notes that changes in lighting can be corrected for by dividing by ambient light measured at the eye. Crum expects smart glasses and environmental sensors to read these signals and adjust rooms to support focus or relaxation.

9. Plasticity is as fast as the incentive requires
Eric Knudsen raised owls in prism glasses shifting vision by 15 degrees. Their auditory neurons realigned to form a second map, and much faster when hunting and feeding depended on it. Huberman's takeaway: habits do not take a fixed 29 or 50 days; they form as quickly as necessary, within limits.

EXAMPLES

1. 40 hours of Call of Duty
Self-identified non-gamers who played 40 hours of Call of Duty developed gamer-level contrast sensitivity that persisted a year later. Work by Alex Pouget and Daphne Bavelier found trained players made the same probabilistic decisions as non-players, but much faster.

2. A homemade swim-stroke analyzer
Crum used AI coding tools such as Perplexity Labs and Replit to build a phone-camera computer vision app that tracks her 10-year-old daughter's roll, arm entry, velocity and stroke consistency. She stresses good coaches come first and that she uses the data to support their cues, not lecture her child.

3. Crum's two absolute-pitch maps
Crum has absolute pitch and can name frequencies such as 442 Hz. Playing Baroque violin tuned to A at 415 Hz, close to modern G-sharp, she heard every A as wrong until she developed a second absolute-pitch map, letting her switch between A415 and A440 with nothing in between. Reading Knudsen's owl paper led her into neuroscience.

4. Breath CO2 tracking Free Solo

At Dolby, CO2 measured from tubes on the floor of a theater showing Free Solo revealed where Alex Honnold summited, abandoned a climb or hurt his ankle, without annotation. Another study found audiences' exhaled chemistry marked when Katniss's dress catches fire in The Hunger Games.

5. The moth that beats the bat

Echolocating bats adjust constant-frequency calls so echoes return in their most sensitive range, tracking Doppler shifts for speed, and use FM sweeps for surface detail. Moths escape about 80% of the time: a few neurons trigger random flight, then a drop to the ground as calls get close, while body structures deflect call energy. Orb-weaver spiders tune webs to resonate; when Crum sings near 880 Hz, the spider reacts as if to a threat.

OTHER RELEVANT

1. Use AI to quiz yourself, not to think for you

Huberman feeds verbatim text from papers he has already read and annotated into AI, asks it to test him, and asks where he is weak, such as third-order conceptual links. Self-testing away from the material is what drives memory. Crum built a free, no-coding protocol for creating a custom AI coach for any skill or health routine.

2. Quantify to motivate, then go beyond summary numbers

Sleep scores and step counts work because they give something to aspire to. Huberman notes 7,000 steps is now considered the threshold, not 10,000. Crum prefers richer feedback on specific components of a skill. Scaring people stops behaviors; making the right ones engaging and measurable starts them.

3. Choose which maps you let technology change

Smartphones took about 15 years to integrate and we are still cleaning up harms such as late-night light and constant contact. With AI arriving faster, be deliberate about which skills you hand off. Berkeley students told Crum many peers cannot start a paper without ChatGPT.

Build Your Ideal Physique | Dr. Bret Contreras

Guest: Dr. Bret Contreras
Date: 2025-09-22 · Duration: 3:03:56
URL: https://www.youtube.com/watch?v=7SIjcX5B1Vs

KEYPOINTS

1. Twice a week per muscle is the safe default; three times works if you manage recovery
Contreras sets the minimum for a beginner at two full-body sessions a week. One brutal, well-coached full-body day can still bring gains for a year or two. Hitting each muscle three times a week may be slightly better but risks spinning your wheels. His preferred structure is a Monday-to-Friday lower–upper–lower–upper–lower split. About 74% of his followers are women, and they usually want three lower days, while men often prefer the reverse.

2. Progressive overload matters more than set counts
Much of the result comes from the first working set, and adding volume doesn't add results in a straight line. He sees many lifters repeating the same weights every week and going through the motions. He prescribes three sets in his online programs and usually two when coaching in person because he pushes clients harder. What matters is logging lifts and gaining strength over time without cutting range of motion or letting form slip.

3. Strength can't rise in a straight line, so rotate lifts
If you added 5 lb a month forever, everyone would be lifting 600+ lb after a decade. Expecting endless PRs leads to contorted form, joint pain and nagging injuries. Borrowing from Louie Simmons, he picks a focus lift each month (a squat-and-bench month, then a deadlift-and-chin-up month) while keeping every movement pattern in the program. Progress should look like a sawtooth that trends up and to the right.

4. Maximum recoverable volume (MRV) depends on exercise choice
MRV is the most volume you can do and still recover. Exercises that load a muscle in its stretched position, such as walking lunges, deep RDLs, Bulgarian split squats and touch-and-go deadlifts, cause the most damage. Hip thrusts, 45-degree hypers, band and cable work load the squeezed position and are easier to recover from. Walking lunges may be the best glute exercise, he says, but they're 'too good' to train frequently, so he often uses step-ups instead.

5. Four lower-body patterns each session: squat/lunge, hinge, thrust/bridge, abduction
He programs one exercise from each pattern, about three sets each, three times a week. That's 36 weekly sets, of which roughly 12 target glute medius and minimus rather than glute max. Alternate bilateral and unilateral squat patterns, and vertical with angled hinges, because single-leg and vertical work cause more soreness. If clients feel beat up, he cuts sets, backs off from failure or swaps exercises.

6. The 'rule of thirds' for glute exercise selection
A third of exercises should be vertical (squats, deadlifts, lunges, step-ups, good mornings). These are the hardest to recover from but work the most muscle. A third horizontal (hip thrusts, bridges, back extensions, reverse hypers). A third lateral or rotary (hip abduction variations), which barely beat you up. He invented the hip thrust by asking why glute-activation moves weren't being loaded heavily.

7. Tempo matters little for growth, but control protects joints
Repetitions lasting 1 second and 8 seconds build similar muscle, which surprises people coming from yoga or Pilates. Exploding up on a hip thrust is fine. He sees tempo mainly as injury prevention, and prescribing slow tempos for quick lifts like shrugs, or 72-second sets with one-minute rests, signals poor coaching.

8. Muscle is hard to build but easy to keep
In Bickel's study, young adults did 27 sets a week for quads for about four months. Cutting to one-ninth of that volume (one set each of squats, leg press and leg extensions once a week) maintained most size and strength. Contreras credits muscle memory, including extra myonuclei from satellite cells, though he notes this is debated. Five studies suggest that more than 30 weekly sets keep adding growth for short specialization blocks, but that isn't sustainable.

9. Muscle grows across a wide rep range
He cites a Schoenfeld paper in which 3×10 squats grew more muscle than 3×3. Broadly, anything from about 6 to 30 reps builds similar muscle if sets are hard. High reps may cause more damage, so lower reps can suit muscles trained frequently. Calves respond to stretch: use full-range or bottom-half standing raises, adding 3–5 lengthened partials at the end; seated raises and top squeezes help less.

EXAMPLES

1. Strong lifting during the 2020 lockdown
His clients trained 2–3 hours a day, six days a week, with spreadsheets and about 55 awards across six lifts: squat, bench, deadlift, military press, chin-up and hip thrust. One client weighing about 130 lb deadlifted 315 for 18 touch-and-go reps but was wrecked for a week and a half. Afterward they dropped music and hype, used reset reps and stricter, lower-rep sets.

2. No-load flexing grows muscle
In a study by Brittany Counts, one arm curled a dumbbell and the other did 4×20 concentrated flexing with no load. The unloaded arm still grew, including the triceps that resisted the movement. Contreras and Huberman suggest a mirror test: if you can't contract a muscle without weight, you'll struggle to train it.

3. One set to failure, twice a week
A client in his Phoenix condo days, trained Monday and Thursday, roughly doubled her glute size in six months and did best on single sets. His most underrated tip is two full-body sessions a week, one set to failure on 6–10 exercises, about 45

minutes each. He thinks that gets around 80% of the gains in a third of the time, as long as you rotate lifts.

4. A one-week break

A study with Brad Schoenfeld as an author found a week off brought no extra gains but little loss. Periodic layoffs cost some strength and size that returns quickly, and breaks help most when they restore motivation or ease nagging pain.

OTHER RELEVANT

1. Lower glutes: reverse lunges or glute-dominant step-ups

Reverse lunges are his top choice if you train glutes once a week, but they can make the adductor magnus very sore. For three sessions a week, use step-ups with a forward lean and the working thigh parallel to the floor. On hip thrusts, the classic mistake is going too heavy to reach full hip extension. Hyperextension should come from the hip (about 10° with bent knees), not the lower back.

2. Start at any age and keep lifting through pregnancy if you already lift

People can build muscle when they start late, even into their 80s or 90s, though gains are blunted. Experienced lifters should keep training while pregnant: sumo squats are well tolerated, and hip thrusts work with the bar on the upper thighs and shallower depth. He doesn't advise starting to lift for the first time during pregnancy.

3. Hip dips and spot reduction

Hip dips are a gap between glute medius and glute max where no muscle exists, so 'hip dip workouts' can't fill them; being lean makes them show. Spot fat loss has been disproven since the 1990s, and abs look best when you're leanest.

4. Plan a schedule you can repeat and revisit it every five years

Huberman passes on advice from neurologist Bob Knight: find the weekly workload you can sustain and update it every five years. Contreras adds that nagging injuries cut daily movement (NEAT), which compounds the cost.

How to Expand Your Consciousness | Dr. Christof Koch

Guest: Dr. Christof Koch
Date: 2025-09-15 · Duration: 2:11:42
URL: https://www.youtube.com/watch?v=2t4vswC-3mY

KEYPOINTS

1. Consciousness is simply experience
Koch, of the Allen Institute and the Tiny Blue Dot Foundation, defines consciousness as the fact that you see, hear, love, dread and dream, not your ability to respond. In early-night deep non-REM sleep or under anesthesia, 'you do not exist for yourself'. Dreams, by contrast, are conscious experiences.

2. Self-consciousness is only one part of consciousness
People confuse consciousness with having a sense of self. In flow, as when Alex Honnold climbs, in meditation or on psychedelics, the inner critic can go quiet while awareness stays high. Koch calls this 'blessed silence'.

3. Consciousness is about being, not doing
You can be highly conscious while motionless, in meditation, dreams or mystical states, and much behavior is unconscious. Koch argues this is why intelligence and consciousness are separate: computers may match everything we do without being anything.

4. Koch says the circuits linking cortex and thalamus generate experience
A beating heart and an active brainstem are enabling conditions, since without blood flow you lose consciousness within about 8–10 seconds. But Koch says the content of experience comes from the circuits linking the cortex and thalamus, and work at the Allen Institute manipulating these circuits supports this.

5. A 'zap and listen' test can measure consciousness
Researchers stimulate the brain with transcranial magnetic stimulation and record the echo with high-density EEG to compute a perturbational complexity index (PCI) from 0 to 1. Waking, dreaming and ketamine dissociation score high, while deep sleep, anesthesia and brain death score low. Across about 300 people, a sharp threshold of about 0.31 separated conscious from unconscious.

6. About a quarter of 'unresponsive' patients are covertly conscious
A large New England Journal of Medicine study found that about 25% of behaviorally unresponsive patients could voluntarily modulate motor-cortex activity on command ('clench your fist for 30 seconds'). Families often decide to withdraw care within days, so Koch founded a company, Intrinsic Powers, to bring testing into the ICU. The FDA has asked for a clinical trial, and his pilot data suggest covertly conscious patients recover more often.

7. We live inside a personal 'perception box'
Borrowing the term from Elizabeth Koch, he describes everyone's reality as built from Bayesian priors: expectations about the world, other people and oneself. #TheDress (white-gold versus blue-black, possibly linked to whether people are morning or evening types) is the harmless version. Opposing readings of 9/11 or October 7 show the same process in politics.

8. Transformative experiences change your priors fast
Reading and films shift you slowly. Direct, first-person 'acquaintance' with something can rewrite your priors in minutes, and the deliberate reworking afterwards is what psychedelic therapy calls integration.

9. You have to believe you can change
Koch believes the mind stays changeable at almost any age. If you're told your condition is hopeless and to 'take this pill and suffer', you won't improve, so seeing yourself as an active agent of your own mind is a precondition for therapy. He credits Alcoholics Anonymous's admission that you can't do it alone, and the community it provides, rather than divine intervention.

10. Belief drives treatment effects
Koch cites a study by Stanford's Boris Heifets: depressed patients having surgery got either ketamine or none under full anesthesia. Both groups improved similarly, and recovery tracked how strongly patients believed they'd received ketamine, which is why Koch says cynicism undermines therapy.

EXAMPLES

1. Oliver Sacks imagining being a bat
Koch, a friend of the neurologist through Francis Crick, says Sacks' gift was empathy: imagining patients' strange inner worlds, such as a man whose memory stopped 20 years earlier. Koch believes we can approximate what it's like to be a bat, contrary to Thomas Nagel's famous essay. To him, that attempt is what empathy is.

2. Koch's 5-MeO-DMT experience
Within three inhaled breaths his visual field fractured into hexagons and his sense of self vanished. All that was left was a point of bright light, terror and ecstasy, with no space or time, and he recovered within an hour with little change in heart rate. He says it taught him that mind doesn't need space, time or a self, and that his fear of death disappeared within weeks. He says he'll never do it again.

3. A VR lesson in being someone else
In Jeremy Bailenson's lab at Stanford, Huberman's avatar became a Black man facing subtle slights on the street and in a job interview. In about 10 minutes, the 2017 experience left him lastingly aware of how others glance at him, which Koch calls a transformative experience.

4. The 'Jennifer Aniston neuron'

Recording from epilepsy patients with neurosurgeon Itzhak Fried at UCLA, Koch's lab (Rodrigo Quian Quiroga and Gabriel Kreiman) found hippocampal-region cells that fired to different pictures of one person, such as Jennifer Aniston or Bill Clinton, and sometimes to their written name.

5. Locked-in patients and the will to live

An Israeli study found that most locked-in patients, except those in chronic pain, wanted to keep living, even though most people beforehand would say they wouldn't. Koch calls this disability bias and notes it complicates advance directives.

OTHER RELEVANT

1. Try Huberman's 'spacetime bridging' meditation

Spend about three breaths on each step: eyes closed, sensing from the skin inward; then eyes open on your own body; on a point 8–10 feet away; on the farthest point you can see; then imagine Earth as a rock spinning in space; then return to your body. Huberman designed it to move between perspectives.

2. Build body awareness in young people

Koch links declining adolescent mental health, which he says began before social media and worsened during the pandemic, to poor interoception, the loss of unsupervised play, filtered social comparison and smaller families. He supports therapies that teach kids to read their body states.

3. Koch's reading and outlook

Koch recommends Marcus Aurelius on controlling how you respond to events. His advice for life: never stop trying to understand the world, and leave it better than you found it.

Transform Your Metabolic Health & Longevity by Knowing Your Unique Biology | Dr. Michael Snyder

Guest: Dr. Michael Snyder
Date: 2025-09-08 · Duration: 2:45:05
URL: https://www.youtube.com/watch?v=cjAvD-U5so0

KEYPOINTS

1. A healthy glucose response is a brief, modest spike
Snyder, a Stanford geneticist, says a normal post-meal spike returns to baseline within about 30–60 minutes. Fasting glucose for most people is around 90. 'Time in range' is a simple target: 70–140 mg/dL for healthy people, 70–180 for diabetics. It correlates strongly with hemoglobin A1c (6.5% or higher is diabetes, 5.7–6.4% is prediabetes), but a CGM shows what's happening in real time.

2. Many 'normal' people spike like diabetics
When Snyder's lab put CGMs on normal, prediabetic and diabetic people, they defined 'glucotypes'. Some people with no diagnosis spiked as badly as diabetics and had no idea. Glycemic response is also more personal than the glycemic index suggests: most people spike to white rice, but individual responses to specific foods vary a lot.

3. Type 2 diabetes is several different problems
Snyder's lab subdivides glucose dysregulation into muscle insulin resistance, liver insulin resistance, beta-cell defects (making insulin but not releasing it from the pancreas) and incretin defects. Muscle-resistant people spike to potatoes and pasta, while insulin-sensitive people don't. People with beta-cell defects also spike to potatoes. The shape of a glucose curve from an over-the-counter CGM can already predict muscle insulin resistance fairly accurately.

4. Your subtype determines what works
Snyder himself has a beta-cell defect. He switched from running to weight training about nine years ago and gained 10 lb of muscle, verified by about 20 whole-body MRIs, yet his glucose control didn't improve, because muscle wasn't his problem. He didn't respond to metformin. For muscle-resistant people, building muscle and training in the morning appear to give better glucose benefits, though exercise at any time beats none.

5. GLP-1 drugs worked dramatically for him, with trade-offs
Snyder's A1c was 8.4%. A lower-dose GLP-1 drug brought it to about 6.4–6.5%, and after he switched to Mounjaro because of modest nausea, it fell to 5.7%. His fat 'evaporated' and mild fatty liver disappeared. He lifts every day, alternating light, heavy and skill days, but still lost some muscle and strength after an injury. He felt gaunt, so he now doses less often than weekly on the lowest dose. He notes that some people use low doses from compounding pharmacies, which the pharmaceutical companies dislike.

6. Visceral fat stresses organs, especially beta cells
Snyder isn't an expert here, but he says fat around organs, such as fatty liver, clearly isn't good. He thinks the pancreas, and beta cells in particular, may be especially sensitive to that fat-related stress.

7. Fiber effects are personal
In an 18-person crossover study, people took 10, then 20, then 30 g per day of arabinoxylan (the fiber family found in psyllium/Metamucil-type products) or inulin, with washouts in between. On average, arabinoxylan lowered LDL cholesterol by about 25%, but some people saw no change even at 30 g, while inulin lowered theirs. Neither fiber affected glucose. Recommended intake is at least 25 g a day for women and 35 g for men, but people typically get 12–15 g.

8. Organs age at different rates: 'ageotypes'
After following about 109 people for more than 12 years with deep blood profiling, Snyder's group sees distinct aging patterns: cardio, metabolic, liver, kidney, immune, or several at once. Like a car where certain parts wear first, these patterns can be acted on. People who lost weight or exercised improved their metabolic ageotype. A company he helped commercialize, Iolo, profiles 650 metabolites from a mailed drop of blood. He notes that 95% of users improved their markers, which isn't the same as getting younger.

9. A whole-body MRI baseline helps when you track change over time
High-resolution scans almost always find nodules, which is why many doctors discourage them. Snyder argues the question is whether nodules grow, and you can't know without a baseline. None of his nine nodules are growing. His group has caught early problems from shifts in an individual's own values, such as liver enzymes, that standard ranges would miss.

EXAMPLES

1. Soleus 'push-ups'
Huberman describes a University of Houston study in which seated heel raises work the soleus. Although it is only about 1% of body muscle, it acts as a strong glucose sponge. Snyder prefers a brisk 20-minute walk after meals, which visibly blunts a rice spike, and uses 'exercise snacks' such as air squats when sitting a lot.

2. A viral illness that preceded his diabetes
Snyder developed a very high fever and became diabetic several weeks later. Because of his own profiling, his team saw DNA methylation shift at about 100 metabolic gene promoters, an example of environment reshaping gene regulation.

3. Immersive events and inflammation
In pilot studies with collaborator George Slavich, attendees at Byron Katie and Tony Robbins events were sampled before, right after and months later. Their mental-health questionnaire scores improved by the field's standards, and early unpublished omics data suggest lower inflammatory markers. The results are preliminary.

4. Berberine 'cheat days'

Huberman recalls that berberine, which he calls a 'poor man's metformin', let him eat a box of donuts without feeling the glucose crash. He flags that as a reason for caution rather than a strategy.

OTHER RELEVANT

1. Walk after meals, especially dinner

People who leave about three hours between dinner and bed, and who walk after dinner, have lower glucose the next day. Going to bed with a high glucose spike correlates with poor sleep. Consistent sleep timing also helps.

2. Find your own responses

An over-the-counter CGM worn for a couple of weeks with food logging shows which foods spike you. Snyder suggests self-experiments such as adding one pure fiber source for a few weeks and checking LDL, ApoB and CGM data before and after.

3. Long exhales during the day

Snyder suggests periodically emptying your lungs with long exhales, as free divers do, throughout the day rather than setting aside time for formal breathwork, to slow heart rate and support HRV.

How to Set & Achieve Massive Goals | Alex Honnold

Guest: Alex Honnold
Date: 2025-01-01 · Duration: 1:49:13
URL: https://www.youtube.com/watch?v=4TsOnsPDKKY

KEYPOINTS

1. Big goals grow out of constant small ones
Honnold sees his free solo of El Capitan as the outgrowth of always having small goals rather than as a single moonshot. He keeps a running to-do list for today and this week, and a climbing journal logging every route, grade and time since about 2005–06. Do something a little new or harder most days, and after 20 years big things 'just happen'.

2. Size each goal to the time you actually have
With kids and travel, he won't start a project at a cliff he can visit only three days a season. Instead he picks a small, novel challenge, like a specific combination of routes he hadn't linked. On the day he described, it was 86°F and muggy and he failed at the very top, and he still counted it as a reason to try his hardest that day.

3. Free Solo balanced intrinsic and extrinsic motivation
Climbing has always been intrinsically motivated for him; he'd want to climb El Cap even if no one else existed. As a professional, film and career incentives add extrinsic pull. He constantly separates the two because, in free soloing especially, you don't want outside pressure pushing you into something you aren't prepared for.

4. The El Cap route was learned in thirds
He memorized every move of the hardest third, knew the medium third as familiar 'motifs', and didn't stress the easiest third, parts of which a non-climber could manage. He spent months a year for several years on the wall and climbed it in spring, when the west face stays shaded until about 11 a.m. to noon, starting around 4 a.m. for roughly eight hours of shade. Despite a muggy morning, on the day 'everything was perfect'.

5. Free-solo risk is misjudged from the outside
Not every slip is fatal: in many places a foot can slip while your hands stay locked, and the skill is knowing which moments allow no error. Even roped trad climbers are effectively soloing until they place their first piece of gear. His preferred statistic: no one has died pushing the cutting edge. The few soloists who died soloing were on easy terrain, and most well-known ones died wingsuiting, BASE jumping, in a rogue wave or in car crashes.

6. Fear is domain-specific and trainable
News programs scanned his brain and suggested his amygdala was unusual. He points out that the fMRI showed standardized photos (a gun, a light socket) that wouldn't scare anyone, and that a real snake in the scanner would have. Speaking in front of a class once mortified him; after years of keynotes it's calm. Huberman agreed that this is proof his threat circuits work normally, tuned by repetition.

7. Effort beats optimization
Climb several days a week, try your absolute hardest each time, and you'll get very good with or without recovery gadgets. Many climbers of past decades got by on cigarettes, coffee and beer. His recovery now is the basics: eat reasonably well, sleep enough, and push his three-year-old on the swings.

8. Mortality as motivation
His father died of a sudden heart attack at 55 while running through an airport when Alex was 19, around the time both grandfathers died. His father had a 'risk-free', relatively sedentary life. The lesson: 'either way you're going to die', so do things you're proud of. Huberman named the non-lethal risk of grinding through a job you dislike and losing vitality you can't get back.

9. Climbing is a lifelong sport
Unlike ball sports, where missing the team ends your playing career, climbers keep climbing, teaching and doing meaningful routes for decades. He has many fit friends in their 50s and 60s, and his childhood hero Peter Croft did some of his hardest-graded solos in recent years in his late 50s or 60s.

EXAMPLES

1. Goals that roll over for years
His yearly goal lists go back years. In some years he completes half or a third of them. Free soloing El Cap sat on the list for years, punted forward each time it looked 'totally out of the question'.

2. Climb a steep staircase, don't pull up the handrail
Huberman 'gassed out' trying to muscle up the wall. Honnold says strong adult men often do this. Drive with your legs and use your hands mostly for balance, as most climbing is a very steep staircase.

3. Honnold's current endurance week
One hour-long run a week, plus one weekly 'cardio adventure' of two to four hours with 3,000+ feet of vertical gain. He wants to climb 3,000 feet quickly without getting very tired. He says he basically never cramps; his performance simply declines steadily over 10–48 hours of effort.

4. Huberman's lower-soreness strength method
Credited to Pavel Tsatsouline: use a weight you could lift for 7–8 reps but do only about 3 per set, stopping well short of failure, with more sets and long rest, possibly pairing push and pull movements. Honnold planned to try it for bench press, which leaves him sore enough to affect his pulling.

OTHER RELEVANT

1. Create one appropriately hard challenge each day

Pick something small, new and slightly harder that fits today's time and conditions, and give it full effort even if no one else would care. Log it so you can see progress over years.

2. Be most careful during 'easy' activities

Huberman's takeaway from elite risk-takers who die doing casual activities: attention drops when the stakes feel low. Lock in for routine risks too.

3. Treat confidence as accumulated reps

Whether it's a cliff or a stage, calm comes from repeated exposure in that specific domain, not from being 'wired differently'.

4. Balance a pulling-dominant life

Climbers tend to hunch from constant pulling. They discussed spinal extension work such as bridge pose for posture.

Science & Health Benefits of Belief in God & Religion | Dr. David DeSteno

Guest: Dr. David DeSteno
Date: 2025-08-25 · Duration: 2:24:18
URL: https://www.youtube.com/watch?v=Whe2Jh9q6jI

KEYPOINTS

1. 'Does God exist?' is not a useful scientific question, but religion's effects are testable
DeSteno, a Northeastern University psychologist, says that when every falsifying finding (like evolution) can be reframed as 'how God works', science cannot settle the question. He chose psychology over religious studies so he could gather data. His conclusion is that religious traditions intuited, long before randomized trials, practices that make life better, and that religion is about what you do, not only belief: many atheist Jews practice and benefit.

2. Pascal's wager works better once there are benefits in this life
Pascal argued that even a tiny chance of infinite, everlasting happiness outweighs earthly pleasures. Critics ask what happens if that chance is zero or you pick the wrong religion. DeSteno says Pascal saw the fix: the bet makes sense if religion also brings benefits in the here and now, and he argues the data show it does.

3. Long-term religious engagement is linked to roughly 30% lower all-cause mortality
Citing Tyler VanderWeele's longitudinal work at Harvard's School of Public Health, DeSteno says people who actively engage with faith over 15–20 years have about 30% lower all-cause mortality and about 25% fewer deaths from cancer and cardiovascular disease, along with less anxiety and depression and more meaning. Following people over time addresses the earlier objection that sick people simply stop attending services. Community helps too, but the effect is larger for religious community than for, say, a bowling club.

4. 'Religioprospecting': mine traditions for practices, then test them
Drug companies once 'bioprospected' traditional cultures and found chemotherapy and pain drugs. DeSteno proposes doing the same with religious practices, then studying them scientifically. Huberman compares this to meditation and psychedelics moving from fringe to funded research.

5. Formal prayer works like breathwork
Recited prayer, such as the rosary or Hindu sutras, slows breathing and lengthens exhales. That increases vagal tone, lowers heart rate and cortisol, and shifts the body toward openness rather than threat, even when you pray about worries. Huberman adds that signals travel up the vagus nerve from the body, not just down.

6. Rituals are 'symphonies' of mind–body tools
DeSteno calls a life hack a single note and a ritual a symphony. In Jewish shiva mourning, eulogies help consolidate positive memories, which bereavement researcher George Bonanno identifies as a key predictor of healthy grieving. Covering mirrors avoids the documented effect of mirrors intensifying whatever emotion you feel. Not shaving or dressing up reduces self-focus, and a minyan of at least 10 people praying in unison adds motor synchrony.

7. Moral behavior is far more variable than people think
Because people feel 'something came over them' when they act badly, religions often place evil outside the self. DeSteno says moral computations happen largely below awareness and shift with context and reputation: we evolved to be adaptive, not saints or sinners. Dimitris Xygalatas found people cheat far less in a temple than in a restaurant kitchen.

8. Certainty, either way, reduces death anxiety
Death anxiety follows an inverted U. Firm believers in an afterlife are least anxious, firm non-believers are next, and the uncertain are most anxious. Many traditions build in non-morbid contemplation of death, such as Buddhist corpse meditations, the Ash Wednesday line 'from dust you came', and the Rosh Hashanah prayer listing who may die in the coming year. Like aging, this shifts values toward loved ones, service and legacy, which DeSteno says bring happiness at any age.

9. A relationship with God guards against loneliness
Religious people report much less loneliness, partly through community and partly through feeling that someone always 'has your back'. DeSteno notes that some evangelical traditions train people to 'listen' for God. He says that seeing God would light up the visual cortex, but that this does not mean the experience reduces to neurons; he does not claim to know whether it is real.

EXAMPLES

1. Meditation tripled helping in a staged waiting room
Novices did eight weeks of meditation led by a Buddhist lama, or were wait-listed, in a study run with Paul Condon. Back at the lab, an actor on crutches showed she was in pain while two seated actors ignored her. About 15% of controls gave up their seat, versus close to 50% of meditators. In an anger-provocation follow-up, meditators, unlike a brain-training control group, refused to inflict pain while still calling the provocation wrong.

2. The rigged coin-flip cheating paradigm
100% of people say lying about a coin flip to avoid a 45-minute task and leave it to the next person is wrong, yet about 85% do it when unobserved. Even when told they must obey the coin, about a third cheat, then invent stories to justify it. Counting blessings for five minutes cut cheating from about 25–30% to 2%.

3. Tapping in sync makes strangers help
Pairs who tapped to the same tones felt more connected and compassionate, and were about 30% more likely to help their partner with an onerous task. They attributed the bond to having perhaps met before.

4. Huberman's worry beads and Greek Orthodox ritual

His high school girlfriend's family explained that prayer, worry beads and small superstitions replace darker, looping thoughts. DeSteno frames these as packaged mind–body practices.

5. Twelve-step surrender

Huberman finds the idea of giving over to a higher power, acknowledging the brain cannot do it all, a compelling reason for belief. DeSteno says religious engagement is associated with lower addiction rates, and that surrender means doing your best and then trusting, like a 'junior partner', not becoming passive.

OTHER RELEVANT

1. Practices you can borrow

Try formulaic prayer or meditation with slow, long exhales, a five-minute gratitude count, and singing, swaying or moving in unison with others. These are practices the research links to calm, honesty and generosity.

2. Sample traditions, and do before you fully understand

Speaking personally, DeSteno, who describes himself as agnostic and on a journey, believes that if God exists there are multiple routes to God. He urges trying different traditions and quotes a rabbi's 'na'aseh v'nishma': we will do, and then we will understand.

3. Contemplate death without dwelling on it

Brief, regular reminders of mortality can redirect attention to relationships and meaning. The aim is to reduce chronic anxiety, not to keep fear constantly switched on.

Curing Autism, Epilepsy & Schizophrenia with Stem Cells | Dr. Sergiu Pa!–6

Guest: Dr. Sergiu Pa!–6
Date: 2025-08-18 · Duration: 2:23:15
URL: https://www.youtube.com/watch?v=H4mMZ0vliMo

KEYPOINTS

1. Autism is a behaviorally defined spectrum, not one disease
Pa!–6 æ÷FW2 F† B WF—6Ò † 2 æò &–öÖ ker and is diagnosed by the presence or absence of behaviors by a certain age. Prevalence is now close to 3%, whereas it was considered rare when he was in medical school. He compares today's 'autism' to 19th-century 'fever,' which could be an infection, cancer or an autoimmune disease needing very different treatments. His lab focuses on profound autism, the severe forms that often come with intellectual disability or epilepsy and may require lifelong care.

2. Genetics are strong; the 'refrigerator mother' idea was wrong
Psychoanalysts in the 1950s–60s blamed emotionally cold mothers. Twin studies in the 1970s showed that if one identical twin has autism, the other very likely does too, and heritability is among the highest of psychiatric conditions. Only in the last 10–15 years have specific genes been tied to profound forms. Prevalence in Scandinavia is around 1 in 30 to 1 in 40, similar to the US, which Pa!–6 6 ys weakens US-specific explanations like glyphosate.

3. The male bias is about 4:1 and may reflect developmental resilience
The ratio varies with severity but is generally around 1 female to 4 males. Pa!–6 ö–çG2 ÷WB F† B &V–ær `emale is one of the best predictors of good outcomes in premature babies, and that male and female nervous systems mature at different paces and may handle injury differently. With autism being many conditions, he cautions against pinning the bias on any one factor.

4. Vaccines and the 'fever effect'
Huberman states for the record that he sees no solid evidence that vaccines cause autism, and Pa!–6 prees there is none epidemiologically. Parent reports that non-verbal children briefly speak in sentences during high fevers are 'mostly anecdotal.' Proposed explanations include noradrenergic activation, cytokines reaching the brain and temperature-sensitive ion channels.

5. Gene therapy options and their limits for the brain
Approaches include adding a missing gene via engineered, non-disease-causing adeno-associated viruses, delivering a missing enzyme directly, or editing DNA with CRISPR (already used for sickle cell disease in blood). The brain is hard to reach: delivery is by surgery or intrathecal injection, viral payloads and efficiency are limited, large genes such as calcium channels don't fit in a virus, and immune responses often allow only one shot. Pa!–6 w2 Æ " –ç7FV B F &vWG2 F†R $ä 7FW downstream.

6. Yamanaka factors turn skin cells into stem cells that can become brain tissue
About 20 years ago, Shinya Yamanaka showed that four factors can revert a specialized cell, such as a skin fibroblast, into an induced pluripotent stem (iPS) cell. This sidestepped embryonic-cell ethics, and Pa!–6 Æ–°ens it to alchemy. Without signals pushing them elsewhere, these cells become neural cells 'almost by default' within days. That lets researchers grow neurons from any patient, including those with rare mutations.

7. Organoids keep an intrinsic developmental clock
Floating 3D balls of cells, inspired by Yoshiki Sasai's work, survived far longer than expected, and the lab kept cultures for 500–800+ days. Without hormone changes or any change in the culture medium, NMDA-receptor subunits (2B down, 2A up) switched to a postnatal signature around nine months, matching birth. Pa!–6 pants to learn whether this timer could be sped up to model aged neurons, for example for Parkinson's, or reversed to rejuvenate them, but says they only have clues so far.

8. Assembloids rebuild circuits by combining parts in the right order
Combining a cortical organoid, a spinal cord organoid and a ball of human muscle yields a circuit in which stimulating the cortex makes the muscle contract within weeks. A four-part sensory assembloid (pain-sensing neurons, spinal cord, thalamus, cortex) only self-assembles in that order. After hundreds of days, the whole pathway flickers in sync. It's being used to study sodium-channel mutations that cause either excessive pain or a dangerous inability to feel pain.

9. Transplanted human organoids integrate into rat brains
Cortical organoids placed into the somatosensory cortex of newborn rats became vascularized, were colonized by rat microglia, and grew to occupy about a third of one hemisphere. They responded when the rat's whiskers on the opposite side were moved. Human neurons grew six to eight times larger than in a dish, making disease features visible: Timothy syndrome neurons are about half normal size. Integration works because the young rat brain is still 'eager to connect.'

EXAMPLES

1. Timothy syndrome: from a single letter to a clinical trial
A one-letter mutation in a calcium channel causes webbed fingers, autism and epilepsy. Patient-derived neurons showed calcium lingering in the cells longer than normal. After about 15 years of study in 2D neurons, organoids and assembloids, the lab found a small antisense nucleic acid that changes how the channel is processed and reversed every defect they had described. Pa!–6 † 2 v F†W&VB porldwide patient cohort and begun producing the drug. He calls it the first psychiatric therapeutic developed exclusively in human stem-cell models.

2. Stem-cell clinic harms
Huberman recounts a Florida clinic whose eye injections for macular degeneration left patients blind quickly, after which the FDA shut down commercial stem-cell injections. He also describes a patient paralyzed and nearly killed by an infected spinal-disc injection abroad. Pa!–6 6 ys parents are sometimes urged to take autistic children to clinics in South America or parts of Europe, and he always tells them no because there is no rationale or regulatory oversight.

3. Follistatin gene therapy tourism

Huberman notes that some people in the biohacking community travel abroad for follistatin gene therapy to build muscle. He says he wouldn't do it himself.

4. 22q11.2 deletion and penetrance

This is the most common microdeletion in humans, at about 1 in 3,000 births, and removes around 60 genes. It brings cardiac and immune issues, plus roughly a 30% risk of schizophrenia (about 30 times the 1% population rate) and a 30% risk of autism. Yet some carriers show minimal effects. Pa!–6 GG ibutes the variability to genetic background and possibly environment. By contrast, every known Timothy syndrome patient is severely affected.

OTHER RELEVANT

1. Be skeptical of unregulated stem-cell injections

Ask what cells are being injected, from whom, and on what evidence. PRP is FDA-approved but contains few if any stem cells. Banked umbilical cells have narrow proven uses, such as certain blood disorders, rather than the universal benefits sometimes advertised.

2. Genetic testing can inform but not fully predict

Deletions like 22q11.2 can be tested for, but variable penetrance means a positive result is a risk estimate, not a forecast. Discuss results with a genetic counselor.

3. Expect progress to come first for clear single-gene forms

Pa!–6 6VW2 6öæF—F–öç2 v—F, öæR 6ÆV " vVæWF–2 6 W6P, like Timothy syndrome, as 'Rosetta stones.' He expects therapies or ev
cures for some of them within the next decade, well before treatments for idiopathic autism.

How to Control Your Cortisol & Overcome Burnout

Date: 2025-08-04 · Duration: 2:16:16
URL: https://www.youtube.com/watch?v=Ibj1k3IZTNU

KEYPOINTS

1. Cortisol's main job is to mobilize energy, not just to respond to stress
Cortisol is a steroid hormone made from cholesterol, like testosterone and estrogen. Its central role is deploying blood glucose so the brain and body have energy for whatever the day demands, including stressors, exercise and focused work. Huberman argues that understanding its 24-hour rhythm, rather than treating it as 'the stress hormone,' is what tells you which tool to use at which time.

2. Cortisol follows four predictable daily phases
A classic study of cortisol secretion found a six-hour low period running from about 4 hours before lights-out to 2 hours after. Cortisol then rises slightly in hours 3 to 5 of sleep and climbs fast in hours 6 to 8, which overlaps with the REM-rich part of the night. A fourth phase follows waking. If you sleep only six hours, you miss most of that late-night rise, and seven hours captures only part of it.

3. The first hour or so after waking is a unique window to boost cortisol
Alongside the HPA axis, the suprachiasmatic nucleus (SCN) can drive extra cortisol through a parallel pathway via the splanchnic nerve. That window is open for roughly 1 to 3 hours after waking. The SCN receives input from melanopsin retinal ganglion cells, which respond to big shifts from dim to bright light, so morning light is the main way to open this pathway.

4. A bigger morning peak leads to lower evening cortisol
Because cortisol regulates itself through negative feedback, a high early peak triggers a steady decline starting around late morning. That leaves you energetic into the afternoon and low in cortisol by night, which helps you fall and stay asleep. Huberman calls this the point to 'bold underline.' Chronically high cortisol at the wrong times is linked to immune suppression, abdominal fat and the rounded 'moon face.'

5. Caffeine barely raises cortisol in habitual users but prolongs it
In people who have had caffeine daily for about five days, 100–300 mg doesn't raise cortisol much. Non-habitual users see a substantial rise. Caffeine does extend how long cortisol stays effective, which is why Huberman suggests delaying it by 60 to 90 minutes if you crash in the afternoon. That way the morning cortisol curve comes down gradually rather than falling off a cliff. If you want caffeine right away, that's fine, as long as you still get light, water and movement.

6. Exercising at a consistent time anchors the cortisol rhythm
Exercise is a strong entrainment cue. If you train within the same 2–3 hour window, ideally four to six days a week with at least one full rest day, your body learns to release cortisol in anticipation, and you start to feel more energetic in the hour before your usual session. Huberman describes this as a Pavlovian effect on a longer timescale.

7. Cold exposure raises cortisol only when it's occasional
Deliberate cold exposure raises cortisol only if you do it about once or twice a week. Done more often, the cortisol effect fades, but the rise in dopamine, norepinephrine and epinephrine continues and, as far as is known, does not saturate. Huberman says there's no evidence that regular cold exposure chronically raises cortisol in women more than in men.

8. Evening light is a potent cortisol trigger because baseline cortisol is low at night
Because evening cortisol is so low, the hypothalamus is primed to respond, and even moderate short-wavelength light can push cortisol up and suppress melatonin. Huberman recommends dimming lights, using red bulbs or a red phone filter (triple-click accessibility shortcut), or glasses that block short-wavelength light. Late-day sunlight in spring and summer is fine.

9. Starchy carbohydrates at dinner help keep evening cortisol low
Higher blood glucose reduces the drive to release cortisol, which helps explain why carb-heavy comfort foods feel calming. Huberman eats moderately or low carb through the day and includes rice, potatoes or yams at dinner around 7–7:30 pm. Ideally you'd stop eating about two hours before bed, but he allows a small snack if hunger keeps you awake.

10. Low-carb diets raise cortisol only temporarily
In the studies Huberman reviews, cortisol rises during the first three weeks of a low-carb diet and then settles back down. His test is simple: if you're low carb and sleeping well, don't worry. If you're sleeping poorly, try adding starch to your last meal. Insulin resistance (metabolic syndrome) is the exception, because cortisol stays high when cells can't use the glucose.

EXAMPLES

1. Grapefruit and black licorice
Grapefruit slows the enzymes that break down cortisol and caffeine. Huberman has started eating one pink grapefruit in the late morning and notices more energy, while acknowledging the effect could be placebo. Glycyrrhizin in black licorice (not red) inhibits 11;"Ô…4@, which converts cortisol to cortisone, and its effect is strong enough that he advises the lowest dose and caution later in the day.

2. Ashwagandha's measured effect
In the best studies he describes, ashwagandha lowered cortisol by about 11–29% at 300–900 mg. Huberman suggests starting at 300 mg, taking it only in the late afternoon or evening, and never taking large doses early in the day. The small amounts in blends (under about 50–100 mg) are not meaningful. He takes 300 mg in the evening himself.

3. The sleep stack and cortisol
Huberman has taken 50 mg of apigenin (from chamomile) nightly for over eight years, along with magnesium threonate and theanine, 30–60 minutes before bed. Apigenin lowers cortisol less than ashwagandha does. He stresses that supplements

come only after the behavioural basics are in place.

4. Cortisol flattening with age and illness

Men's and women's cortisol patterns look similar until about 40, with women's baseline slightly lower. Between about 40 and 70, the morning peak becomes rounder and the afternoon decline flatter. Flattening also appears around menopause. In studies of people with cancer, a steeper fall in cortisol through the afternoon predicted longer survival, though Huberman notes it's not the only factor.

OTHER RELEVANT

1. Morning stack

Within 30–60 minutes of waking, get outside and look toward the sun without sunglasses. This matters even more on cloudy days. Before dawn, a 10,000-lux lamp (around $100) is a backup. Drink 16–32 oz of water, with electrolytes if you like, and exercise early if you can.

2. Burnout type 1: wired in the morning, crashing in the afternoon

If you wake too early feeling anxious, cortisol is likely rising too steeply. Huberman suggests 10–30 minutes of NSDR or yoga nidra on waking, citing a study in which 11 minutes lowered cortisol. Set an alarm in case you fall back asleep.

3. Burnout type 2: tired in the morning, wired at night

Focus on the six hours before bed and the two hours after. Avoid bright light and late caffeine, use physiological sighs (two nasal inhales, then a long mouth exhale), and eat starches at dinner. Then push the morning cortisol peak higher with light, hydration and exercise. Huberman notes that true night owls have a normal rhythm, just shifted later.

4. Late workouts are okay with a cooldown

Moderate-to-intense training late in the day can triple or quadruple cortisol, but training as late as sundown is usually fine. Afterward, eat starchy carbs and use exhale-emphasized breathing so the natural evening decline can resume.

Health Effects & Risks of Kratom, Opioids & Other Natural Occurring Medicines | Dr. Chris McCurdy

Guest: Dr. Chris McCurdy
Date: 2025-07-21 · Duration: 2:42:52
URL: https://www.youtube.com/watch?v=gyE6Z4GLEeM

KEYPOINTS

1. Kratom is a Southeast Asian tree whose effects depend on dose

Kratom (Mitragyna speciosa) is native to the border region of peninsular Malaysia and Thailand. There, outdoor laborers chew fresh leaves or drink a decoction boiled for hours, using it much as people use coffee to get through heat and hard work. Traditionally it is also used for pain, mood and as a 'nature's Viagra.' McCurdy describes the paradox: small amounts act as a stimulant, while larger amounts produce a more euphoric, sedative, opioid-like effect, which men in the region used socially on weekend evenings in a mostly alcohol-free Muslim culture.

2. US kratom products are very different from the traditional leaf

Western products start as dried leaf, mostly from Indonesia (roughly 250,000 farmers), exposed to sun and air and shipped around the world. Ground leaf in capsules or as powder stirred into water is the closest thing to traditional use, and absorption is slow because the body has to extract the alkaloids itself. Extracts, concentrates and isolates made with ethanol, oil or juice deliver the compounds already pulled out, so they are absorbed much faster. McCurdy compares this range to light beer versus fortified spirits.

3. Read servings per bottle, not just the serving

McCurdy's lab has tested nearly every product on the market, and a single labeled serving is broadly similar to a traditional glass of tea. The danger is in the number of servings per container: a bottle may hold 2, 9 or 15. Someone used to downing a two-serving bottle can swallow a 15-serving shot in one go, in a form that is absorbed quickly. Some shots sit next to 5-hour Energy at gas stations.

4. 7-hydroxymitragynine products behave like pure opioids

The leaf contains roughly 20–40 alkaloids. The main one, mitragynine, is converted in the body into 7-hydroxymitragynine, which acts only on opioid receptors, and the plant itself has never been shown to make it. Manufacturers now synthesize it and sell semi-synthetic 'kratom-derived' products or isolates, under a dietary-ingredient loophole that treats metabolites as dietary ingredients. McCurdy's rat study (on bioRxiv, headed to the Journal of Pharmacology and Experimental Therapeutics) found these products cause respiratory depression equivalent to opioids.

5. Whole-leaf kratom acts on three pain systems at once

Mitragynine has only weak opioid-receptor affinity. Other alkaloids act strongly on serotonin, which affects mood and pain, and on adrenergic receptors, which drive stimulant activity. McCurdy calls the leaf a 'pharmaceutical shotgun' or 'symphony orchestra' that combines opioid, serotonergic and adrenergic pain relief in a way no single drug does. This may explain why some users call it the best pain relief they have had. He stresses that most of the roughly 1,000 papers on kratom, about 10% from his lab, study mitragynine alone, and 'mitragynine does not equal kratom.'

6. Physical dependence is real and tolerance builds for pain relief

A single use will not create dependence, but regular use can. Missing a morning dose brings headaches and misery similar to caffeine withdrawal, and with stronger products some users report restless legs, which looks more like opioid withdrawal. Pain-relieving effects seem to lose strength over time, pushing doses up. There are no chronic studies in humans or animals to say how quickly this happens.

7. Use is widespread and mostly not for getting high

Published estimates are 2–2.5 million US users, but sales and imports (1,950 metric tons a month in 2019) suggest over 20 million daily users. In McCurdy's ecological momentary assessment study, people logged each dose by smartphone. Most used it for energy, mood elevation and pain, including as a pre-workout or post-workout aid, and often within 30 minutes of waking. A smaller group used it to get high, probably with concentrates, and others used it to get off opioids.

8. Quitting kratom has no evidence-based protocol yet

Before COVID, addiction physicians in Gainesville saw patients improving after switching from opioids to kratom. After COVID, they saw people seeking treatment to get off kratom. Clinicians often use buprenorphine (Suboxone) or methadone, which seems to work, but McCurdy worries this addresses only the opioid component, ignores the serotonin and adrenergic effects, and may leave people dependent on a pure opioid that is harder to quit. Counseling and social support matter alongside medication.

9. Vein colors are mostly marketing

White, red, green, brown and yellow 'vein' products reflect how leaves were dried, plus sun or cold damage to trees normally grown in the shade. Alkaloid profiles across the colors are very similar in the lab's analyses, though other chemical differences cannot be ruled out. Huberman compares this to the indica-versus-sativa debate in cannabis.

EXAMPLES

1. The 'little blue bottle' habit

Huberman recounts a friend's assistant who went from one kratom-kava bottle to six a day and felt anxious and unwell with headaches when she cut back to three. That pattern resembles escalating nicotine pouch use.

2. The 2007 seizure case

In the first human case report (2008), with emergency physician Ed Boyer, a man who had switched from Dilaudid to leaf

kratom cold turkey took his wife's modafinil and had a full seizure. Afterward he quit kratom with only a runny nose and no cravings, a striking but single, caveated case that shows the risk of mixing drugs at home.

3. Coca leaf and Coca-Cola

Coca-Cola still imports Peruvian coca leaf through the Stepan Company in New Jersey. Alkaloids are removed for pharmaceutical cocaine, still the best local anesthetic for nasal and eye surgery, and the decocainized extract flavors the drink. The WHO is reviewing coca leaf, which is rich in calcium and vitamins, and McCurdy's lab plans to study it.

4. Theobromine in cacao

Theobromine, the main alkaloid in cacao, is a xanthine and close relative of caffeine with one fewer methyl group. It is a mild stimulant that may aid respiration, similar to theophylline, which was long used for asthma.

5. Medicines borrowed from nature

Morphine was the first alkaloid ever isolated and cocaine the second. Berberine from tree bark lowers blood glucose. GLP-1 drugs trace back to peptides in Gila monster saliva.

OTHER RELEVANT

1. Keep kratom away from anyone under 18 to 25

State limits are 18 or 21. McCurdy would prefer about 25 because the prefrontal cortex is still developing and the effects of kratom on young brains are unknown. Teens are drawn by 'you'll get high' claims and may take a second dose before the first hits.

2. Adults who use leaf products should go low and slow

Regular users commonly say 'less is more.' Never ratchet doses up, and treat dependence as a real possibility. Whether a few days off feel like caffeine withdrawal varies from person to person.

3. Avoid 7-OH, 'kratom-derived' and isolate products

Huberman's suggested framework: block young people's access, advise caution and the minimum effective dose for adults using leaf, and restrict the opioid-like derivatives. Many buyers do not realize they are not getting leaf.

4. Do not combine kratom with other drugs

No studies test kratom with alcohol. There are anecdotal reports that it reduces drinking, and NIAAA-funded groups are studying it for alcohol use disorder, but 7-OH products depress breathing like opioids. The modafinil seizure case shows the risk of combining substances at home. Tell clinicians exactly which product you used.

How Nature & Other Physical Environments Impact Your Focus, Cognition & Health | Dr. Marc Berman

Guest: Dr. Marc Berman
Date: 2025-07-14 · Duration: 2:11:46
URL: https://www.youtube.com/watch?v=ewnvjnuFTOY

KEYPOINTS

1. There are two kinds of attention, and only one fatigues
Berman, a University of Chicago environmental neuroscientist, builds on his mentor Steve Kaplan's Attention Restoration Theory. Directed attention is choosing what to focus on, such as a lecture, paper or math problem, likely relying on frontal cortex. It runs down with use, which is why students start nodding off about 45 minutes into his lectures. Involuntary attention is captured automatically by something interesting and doesn't tire.

2. Depleted directed attention costs more than focus
Berman argues directed attention helps control nearly all behavior. When it is fatigued, impulse control drops, people can behave more aggressively and goals slip. He notes a puzzle: the brain uses about 20% of the body's energy whether you are sleeping or solving calculus, so the neural basis of mental fatigue is still unclear.

3. Nature restores attention through 'soft fascination'
Two ingredients matter. Natural settings make few demands on directed attention: no streets to cross, traffic or ads. They also offer softly fascinating stimulation, such as a waterfall's sound and froth, that engages involuntary attention while leaving room for your mind to wander. Times Square is 'harshly' fascinating: it grabs all your attention and leaves none for reflection.

4. The benefit doesn't depend on enjoying it
Mood improved on nature walks, but mood gains barely correlated with the cognitive gains. People who walked in January at 25 °F and hated it got the same working-memory boost as June walkers at 80 °F who loved it. Berman concludes something deeper than pleasantness is at work.

5. Pictures and sounds help, but less than the real thing
About 10 minutes of viewing nature photos, rating each from 1 to 3 to keep people engaged, also improved backwards digit span relative to urban photos. Nature sounds and videos help too. Berman cautions the effects are smaller than a real walk.

6. Fractals and compressibility may explain the effect
Natural scenes contain repeating fractal patterns, curved edges and color variation. Berman's student ran a JPEG compression algorithm on thousands of images, and nature scenes compressed into fewer bits than urban scenes, suggesting they may be easier for the brain to process. Brain signals measured by MRI and EEG are more fractal when the brain exerts less effort: in easy or well-practiced tasks, and less so with age. Nature may push the brain toward that restful state.

7. Rumination doesn't spoil a nature walk
Berman worried that walking alone might deepen rumination in depressed people. Instead, participants with clinical depression, deliberately prompted to recall a troubling memory first, gained even more working memory than non-clinical participants. He suggests nature frees attentional resources that rumination normally consumes.

8. Restoration differs from meditation
Meditation uses directed attention; nature restoration is passive and relies on involuntary attention. Berman wonders whether ancient practices held in beautiful settings combined both. Huberman frames the distinction as 'passive restorative' versus 'passive depleting' activities like phone scrolling, and speculates that focus circuits can strengthen or atrophy with use.

9. A restorative environment needs extent and compatibility
Kaplan's criteria include extent, meaning enough to explore, though not Yosemite scale. Berman's example is the roughly 100-square-meter Garden of the Phoenix near his office, with a path, a small waterfall and a view of Lake Michigan. The setting also has to fit your goals. For maximum benefit Berman suggests solitary time without phones, music or podcasts.

EXAMPLES

1. The 2008 Ann Arbor walk study
Participants did a backwards digit span task (repeating up to nine digits in reverse), then walked about 2.6 miles (around 50 minutes) through the Ann Arbor Arboretum or busy downtown streets. They had no phones and wore GPS watches to confirm the route. A week later they did the other walk. Working memory and directed attention improved by about 20% after the nature walk compared with the urban walk.

2. Roger Ulrich's hospital-window study
In a 1980s study at a Philadelphia hospital, gallbladder-surgery patients randomly assigned to rooms with a modest view of trees and shrubs went home about a day earlier and used less pain medication than those facing a brick wall.

3. 580,000 Toronto trees
Using health data on about 30,000 residents and a catalog of every public tree, Berman's team found that one more tree per block was linked to a 1% rise in perceived health. That was comparable to a $10,000 higher neighborhood income or being seven years younger. One more tree per neighborhood was linked to a 1% reduction in stroke, diabetes and heart disease, equivalent to $20,000 more income or being 1.5 years younger. Berman stresses the data are correlational.

4. Happy hour then and now
Huberman recalls daily end-of-day drinks in Berkeley's psychology library until the late 1990s, and Friday volleyball happy

hours in graduate school. They ask whether phones filled that gap with passive depletion. Berman says happy hour was probably good socially but not for directed attention.

OTHER RELEVANT

1. Walk before focused work

Treat time in nature like a warm-up before lifting. If you can't focus even after good sleep, morning light and caffeine, Berman's first suggestion is a walk in nature.

2. Use substitutes when you can't get outside

A window view, nature sounds, videos or photos give smaller but real benefits.

3. Aim for about 20 minutes, alone and unplugged

Huberman takes away a minimum of about 20 minutes. If daily isn't realistic, take longer outings on weekends and leave the phone and earbuds behind.

4. Bring nature indoors and into cities

Plants, greenery in hospital rooms and possibly aquariums may help. Huberman's view on aquariums is a personal impression without data. Street trees appear to carry measurable community health associations.

Control Your Vagus Nerve to Improve Mood, Alertness & Neuroplasticity

Date: 2025-06-23 · Duration: 1:51:15
URL: https://www.youtube.com/watch?v=CLbVW3Pj46A

KEYPOINTS

1. The vagus nerve (cranial nerve 10) is mostly a sensory highway, not a 'calm-down switch'
About 85% of vagal neurons are sensory: their cell bodies sit in ganglia near the brainstem (the nodose ganglion), with one branch reaching an organ and another going to the brainstem. They carry chemical and mechanical information from the gut, lungs, heart, spleen and other organs. The remaining ~15% are motor outputs from brainstem nuclei back to the organs.

2. Activating the vagus can raise alertness as easily as it lowers it
Huberman calls the idea that vagal activation always calms you a pervasive myth. For an exam the vagus is 'mixed, parasympathetic', but which branch is engaged determines whether you get more sympathetic (alert) or parasympathetic (calm) tone. Neurophysiologists stimulate the vagus to wake up the brain, and it has been used to pull patients out of too-deep planes of anesthesia.

3. Rubbing in or behind the ear calms you only slightly
An auricular sensory branch of the vagus runs behind and just inside the ear, and gentle pressure there does feed a parasympathetic pathway. Huberman's caveat: it nudges arousal down a bit and will not rescue you from a panic attack. It is one minor branch, not enough to tilt the autonomic seesaw.

4. Exhales slow your heart through a vagal brake on the sinoatrial node
On an inhale the diaphragm drops, the heart gets slightly more room, blood moves more slowly through it, and the sympathetic system speeds the heart up. On an exhale the heart has less space and blood moves faster, which is sensed and relayed to nucleus ambiguus. Vagal motor neurons there release acetylcholine onto the sinoatrial node and slow the heart. That periodic braking is the basis of heart rate variability (HRV).

5. The heart-slowing pathway is under conscious control and gets stronger with use
Input runs from the left dorsolateral prefrontal cortex via the cingulate and insula to nucleus ambiguus, so a deliberate long exhale engages it. Because the circuit is plastic, using it strengthens background autoregulation, including during sleep. Transcranial magnetic stimulation over dorsolateral prefrontal cortex slows heart rate and raises HRV even after stimulation stops.

6. HRV falls with age partly because this circuit degenerates
Higher HRV correlates with better health, longevity and performance outcomes. It declines with age partly from lower physical activity and partly from atrophy or strokes affecting dorsolateral prefrontal cortex. Huberman frames regular deliberate exhales, plus high-intensity interval training, as ways to keep HRV higher over time.

7. Moving large muscles wakes the brain through adrenaline acting on the vagus
Peter Strick's tracing work at the University of Pittsburgh showed that motor, cognitive and emotional brain areas all connect to the adrenals. Moving the legs and trunk releases adrenaline, which cannot cross the blood-brain barrier. Instead it binds receptors on vagal sensory axons, which release glutamate in the nucleus tractus solitarius (NTS). The NTS activates the locus coeruleus, which sprays norepinephrine across the brain.

8. Adult neuroplasticity needs alertness plus focus, and the vagus feeds both
After roughly age 25, passive exposure no longer rewires the brain much; you need alertness, focus and incremental effort, and the rewiring itself happens during deep and REM sleep. Acetylcholine from nucleus basalis acts as a gate for plasticity (Mike Merzenich's experiments showed rapid remapping when it is stimulated). The NTS also drives nucleus basalis, which helps explain why vagus nerve stimulation speeds motor recovery after stroke.

9. Gut serotonin stays in the gut but tells the brain to make more
About 90% of the body's serotonin is made in the gut by enterochromaffin cells from dietary tryptophan, but it does not travel to the brain. It binds vagal sensory endings in the stomach and intestines. The signal passes through the nodose ganglion and NTS to the dorsal raphe nucleus, the source of most brain serotonin. Huberman stresses that serotonin should be neither too high nor too low.

10. Only some popular vagus 'hacks' actually activate calming fibers
Huberman ran five common practices past a neurologist-psychiatrist and a neurosurgeon. They said three are supported by recordings from those pathways: a neck stretch, correct humming, and extended exhales. He still ranks the physiological sigh as the fastest way to calm down.

EXAMPLES

1. Physiological sigh: chemical plus mechanical signal
Two inhales through the nose (the second a short, sharp top-up) followed by a long exhale through the mouth to empty lungs. Offloading carbon dioxide sends a chemical calming signal and the exhale slows the heart. A plain long exhale gives mostly the mechanical signal.

2. Neck peri-arterial stretch
Sitting with palms down and elbows at the table edge, press the elbows down and away from the ears, then turn the head up and to the right, then up and to the left. This mechanically engages vagal fibers along the side of the neck, with most of the parasympathetic effect on the right side. He judges it slower and weaker than the sigh.

3. Humming 'H', not 'M'
A speech neurophysiology expert told him to extend the throaty H part of the hum. That keeps the vibration in the back of the

throat (similar to gargling) and lets you move it down into the chest and belly, where vagal branches to the larynx are engaged. Since a hum is also a long exhale, it slows the heart too. He finds it easier lying down, and notes that singers use the same trick for low notes.

4. Stanford fermented-food data

He cites Justin Sonnenburg and Christopher Gardner's work: 1–4 servings a day of low-sugar fermented foods (refrigerated sauerkraut, kimchi, kefir, low-sugar yogurt, kombucha) improve microbiome diversity. That supports gut serotonin production, but only when dietary tryptophan is sufficient, for example from dairy or white turkey meat. He warns that kombucha contains some alcohol.

5. Nostril cycling from Noam Sobel

Huberman notes that olfaction researcher Noam Sobel confirmed that dominance switching between the left and right nostrils, roughly every 90 minutes, tracks the autonomic seesaw. He uses it to show that some yogic claims are mechanistically on target.

OTHER RELEVANT

1. Sprinkle 10–20 extended exhales through your day

Whenever you remember, lengthen or intensify an exhale to tap the heart brake, then carry on. More repetitions likely strengthen the pathway more, but no one knows the exact dose. The effect fades if you stop entirely.

2. When you feel lethargic, move big muscles hard instead of jogging gently

After a warm-up, do jumping, sprints or heavy sets (six reps or fewer, near failure) with the legs and trunk to release enough adrenaline to drive the vagus–locus coeruleus pathway. Long, rhythmic, low-intensity work may stay below that threshold.

3. Schedule learning for 1–3 hours after non-exhausting exercise

That window combines norepinephrine-driven alertness with acetylcholine-driven focus. Avoid training to exhaustion, which tips you into a parasympathetic slump. Protect sleep that night, because that is when the rewiring happens.

4. Be cautious with chemical shortcuts to focus

Alpha-GPC, huperzine, caffeine and low-dose nicotine can raise acetylcholine or norepinephrine. Huberman stresses that nicotine is highly habit-forming, raises blood pressure and constricts blood vessels, and is not something he recommends for young people. He calls smoking, dipping and vaping terrible for health.

5. Do not expect SSRIs or gut fixes to be simple mood switches

SSRIs help some people (including with clinical OCD) and give others troublesome side effects, so psychiatrists adjust them by trial; Wellbutrin is a non-SSRI alternative. Raising serotonin may help partly by enabling plasticity, which lets depressed patients learn new, more hopeful contingencies.

How to Grow From Doing Hard Things | Michael Easter

Guest: Michael Easter
Date: 2025-06-16 · Duration: 3:05:40
URL: https://www.youtube.com/watch?v=SsKkZTjUJEk

KEYPOINTS

1. Modern comfort is an evolutionary mismatch
Easter argues humans evolved outdoors, often too hot or cold, walking roughly 20,000 steps a day while carrying children, tools or meat. We are wired to take the easiest option because conserving calories once aided survival. With food, transport and climate control now effortless, those instincts backfire and drive many modern diseases.

2. The 2% rule: pick the slightly harder option
His newsletter is named for a study finding only about 2% of people take the stairs when an escalator is available, even though nearly everyone knows the stairs are better. He treats that as a metaphor for daily life: in the trenches of ordinary routines, choose the mildly uncomfortable route that pays off long term, and the small gains stack up.

3. Incidental movement can rival formal exercise
Easter points to non-exercise activity thermogenesis (NEAT), all movement that isn't dedicated exercise. He cites Mayo Clinic data in which people who move a lot during the day burn around 800 extra calories, which he roughly equates to running eight miles. Steps, he says, are one of the metrics most correlated with better health, and the average American gets only 4,000 to 6,000 a day.

4. Outdoor movement differs from the treadmill
A treadmill at a set incline with a TV on removes the uneven terrain, weather and surprises of a trail. Huberman adds that the optic flow of moving forward appears to quiet the amygdala and other fear areas. He cites several studies from roughly 2016 to 2020 showing that lateral eye movements, the basis of Francine Shapiro's EMDR, suppress amygdala activity, and says he once dismissed EMDR as nonsense.

5. Misogi: one annual challenge with about a 50-50 chance of success
The idea comes from Marcus Elliott, an MD who runs the P3 sports-science facility in Santa Barbara. There are two rules: roughly even odds of finishing, and you can't die. The value is pushing past what felt like your edge and then asking where else you sell yourself short. Easter says to keep it to yourself, since chasing likes or someone else's time caps your effort.

6. Rites of passage work through the story you tell afterwards
Cultures independently created ordeals that took a person from point A to a more capable point B, followed by a gathering to ask what they learned. Easter links this to event centrality: people who make a bad event the core of their identity tend to have worse mental health than those who ask what they can learn from it.

7. Boredom is an evolved signal to change course, not an emergency
Easter frames boredom as a signal that the return on your current activity is running thin, as when foragers moved on from a barren area. Phones now offer an instant escape. He warns that cutting phone time often just moves people to Netflix. The gain comes from sitting with boredom until your own ideas surface.

8. Spending versus investing dopamine
Huberman argues that scrolling doesn't deliver big dopamine hits so much as a low-level leak, which he likens to mental chewing gum. Effortful work, exercise and undistracted reflection also use dopamine but pay something back. Easter adds a counterweight: after a day of writing, training and chores, 20 minutes of dog videos is fine and needn't bring guilt.

9. Humans are built to carry, and walking with weight trains strength and cardio together
Building on Dan Lieberman's 2004 persistence-hunting work, Easter notes that after a hunt someone had to haul the meat home. He says humans are the only mammal that can carry weight over long distances. Rucking, which he now calls walking with weight so it sounds less military, combines cardio and strength, burns more calories per mile than unloaded walking, and is easier on the body than running.

10. Frictionless foraging erodes your baseline
The hosts' shorthand for the danger is low-friction, high-speed foraging, the moment to get out. Easter describes how slot machines, legal sports betting on phones (now including bets on single plays, plus parlays) and junk food were all engineered to speed up the reward loop. Huberman adds online pornography and short-form video as cognitive parallels.

EXAMPLES

1. 33 days in the Arctic
For The Comfort Crisis, Easter spent 33 days in the Arctic, flown more than 100 miles out in a tiny plane. He hauled water, carried a rifle on bathroom trips because of grizzlies, went cold and hungry, and packed more than 100 pounds of caribou back to camp. Afterwards the flight home he usually hates felt luxurious, and the calm lasted about a month.

2. The loss disguised as a win
Slot machines were a casino sideshow until Si Redd, inspired by grandchildren hooked on Atari, helped bring in screen-based machines with programmable odds and many paylines in the 1980s. A $1 bet that pays back 40 cents lights up like a win. Easter says slots now bring in about 85% of casino revenue, and a button replaced the pull handle to speed up play.

3. The three V's of junk food
Easter quotes a food-industry figure who said a successful snack needs value (cheap), variety (think many Doritos flavors) and velocity (quick to eat in large amounts). He ties the 1970s push to invent snacking as a category to the rise in obesity.

4. Kenneth Wright's camping studies and the three-day effect

Huberman describes University of Colorado Boulder research in which two nights of camping, with no alarms, reset students' melatonin and cortisol rhythms. Easter cites David Strayer at the University of Utah, who studies a three-day effect: feeling calmer, sharper and kinder after three days in the wild.

5. Backcountry hunters lost fat, not muscle

Easter cites a study of about 12 Alaskan hunters who carried heavy packs into the mountains for roughly a week. They lost a meaningful amount of weight, almost all of it fat, with a tiny gain in muscle. He stresses how small the sample was.

OTHER RELEVANT

1. How to start walking with weight

Easter suggests women begin with about 5 to 20 pounds and men with about 10 to 30, depending on fitness, then build gradually. He blames injuries in former soldiers on starting at around 100 pounds. His ceiling is about 50 pounds, or roughly a third of body weight, citing military research. His own usual load is 35 to 40 pounds, which is challenging but still enjoyable.

2. Make daily tasks 2% harder

Take calls while walking, carry a basket instead of pushing a cart, park far away, take the stairs, and turn off background noise. Easter says humans have made the world about four times louder, and that silence feels odd at first but tends to calm people. Huberman adds: notice the trivial resistance you feel to small tasks.

3. Walk and talk

Easter and his wife walk 8 to 12 miles on Saturdays. He says the first hour is small talk and the deep conversations come by hour two, something he doesn't think happens on the couch in front of Netflix.

4. Protect your peak hours

Easter sleeps around 8:30 pm, wakes between 3:30 and 4:30 am and writes four to five hours first. He trains around 4 pm and stops caffeine around noon, after a cold-turkey quit that brought about 28 hours of flu-like symptoms and a week of headaches. Huberman, very caffeine tolerant, takes roughly 600 to 800 mg a day with a cutoff around 2 pm, and notes that large coffee-shop brews can far exceed the 150 mg often quoted for a cup.

Improving Science & Restoring Trust in Public Health | Dr. Jay Bhattacharya

Guest: Dr. Jay Bhattacharya
Date: 2025-06-09 · Duration: 4:26:33
URL: https://www.youtube.com/watch?v=2Y_PxTxLFVg

KEYPOINTS

1. Bhattacharya frames the NIH's mission around results for real people
Bhattacharya, the NIH director and a Stanford health economist, describes the stated mission as supporting research that advances the health and longevity of the American people. NIH work underlies almost every drug Americans take. But he says US life expectancy was almost flat from 2012 to 2019 while Europe's rose, and it only recently returned to 2019 levels, so the investment isn't translating into longer lives.

2. We have a 'sick care' system rather than a health system
The hoped-for 'compression of morbidity', where people live long and are seriously ill only briefly at the end, hasn't happened. Advances instead let people stay sick longer with dementia, diabetes complications, kidney failure and heart disease. Bhattacharya says basic science matters but must eventually translate into better health, and he links this to the Make America Healthy Again push to meet the country's chronic-disease needs.

3. Indirect costs concentrate funding in a few universities
On top of each grant, universities receive overhead: about 55% at Stanford, so a $1 million grant costs taxpayers roughly $1.55 million. Some institutions charge up to about 75%, while the Gates Foundation pays around 15%. Infrastructure attracts grant-winners and grant-winners fund infrastructure, a ratchet that favors coastal elite schools. He also questions why a computer-based epidemiology lab gets the same rate as a wet lab. He wouldn't comment on the litigation that blocked a proposed 15% cap.

4. Taxpayers fund research, then pay again for the results
Huberman notes the public pays for research yet had to buy journal articles (around $34 each). Under a policy begun by former director Monica Bertagnolli and moved up under Bhattacharya, NIH-funded papers must be free to read immediately on publication.

5. Americans pay 2–10 times more for the same drugs
Often the same drugs come from the same factories as Europe's. Bhattacharya argues US taxpayers fund most basic research through the NIH and, through higher prices, the expensive late-stage trials, making them 'the piggy bank for the world'. He says a recent executive order aims to equalize prices through trade negotiations, tariff linkage and drug reimportation, so other wealthy countries share research costs.

6. Young scientists get funding too late, which slows innovation
The typical age for a first major R01 grant rose from the mid-30s in the 1980s to the mid-40s. His research found that scientists use the newest ideas just after their PhD, and the ideas they work on age by roughly a year with each year of their career. Huberman describes the 'shell game' of proposing work that's already done. Bhattacharya calls funding early-career labs a major priority.

7. Bhattacharya wants replication rewarded, not buried
He cites John Ioannidis's 2005 paper 'Why Most Published Research Findings Are False': peer review doesn't rerun experiments, statistical significance allows false positives, and negative results go unrewarded. Drug companies replicate findings privately. He plans large NIH grants for replication and meta-analysis and an NIH journal for replication results, like a Cochrane-style 'community notes' for the scientific literature.

8. Bhattacharya says COVID lockdowns and school closures were known mistakes at the time
Sweden kept schools open for under-16s and, comparing with Finland in summer 2020, found no difference in COVID outcomes, with teachers no worse off. He says Sweden ended up with Europe's lowest all-cause excess deaths, while heavily locked-down Peru fared badly, so lockdowns were neither necessary nor sufficient and they harmed poor and working-class people and children. Many American children fell two or more years behind in school.

9. Bhattacharya says cloth-mask messaging wasn't based on evidence
A Cochrane review of about a dozen pre-pandemic flu trials found weak evidence for community masking, and no randomized trial studied children. Yet the US recommended masks from age two, while much of Europe started around age 12. He argues false reassurance may have led vulnerable older people to take risks, and that messaging like 'mask on to walk in, off to eat' eroded trust.

10. Bhattacharya says most vaccines save lives but the COVID vaccine wasn't net beneficial for everyone
He says many vaccines, including childhood ones, save lives. But he believes the COVID vaccine was likely net harmful for some groups, especially healthy boys and young men (very roughly 12–30), while declining to set a firm cutoff. The pivotal mRNA trials followed people for only about two months, measured symptomatic infection rather than death or transmission, and underrepresented older people. He considers long COVID and vaccine injuries both real.

EXAMPLES

1. Ben Barres on career timing
Huberman recalls his late postdoc adviser at Stanford saying the critical work is done early and 'nobody does anything after they get full professor', which supports Bhattacharya's finding that new ideas peak early in a career.

2. Linda Buck's retractions
Huberman praises the Nobel laureate for retracting three papers when a postdoc's data proved wrong, which didn't hurt her

career. Bhattacharya contrasts this with Alzheimer's research built on manipulated data that no one went back to check. He argues fraud is a symptom of incentives that make admitting error career-ending, rather than the main driver of the replication crisis.

3. The Great Barrington Declaration fallout

After he co-wrote the Declaration in October 2020 with Sunetra Gupta (Oxford) and Martin Kulldorff (Harvard), about 100 colleagues signed a petition asking Stanford's president to silence him. He says the medical school dean asked him to stop doing press, and the Twitter Files later showed he'd been placed on a trends blacklist.

4. Vaccines and autism

He calls the Wakefield data contaminated and cites a large Danish study that found no link between the MMR vaccine and autism. He thinks vaccines are unlikely to explain rising autism rates, but notes less research on other vaccines. He has launched a wide-ranging NIH initiative on autism's causes, looking at environmental chemicals, in-utero events, nutrition and more.

OTHER RELEVANT

1. Read health headlines with replication in mind

A single peer-reviewed study isn't proof. Bhattacharya stresses checking whether independent groups have reproduced a finding and paying attention to negative results.

2. Judge trials by what they actually measured

His critique of the COVID vaccine trials is a reminder to check how long a trial followed people, which outcomes it measured, and whether the people most at risk were well represented.

3. Bhattacharya says disagreement makes public health stronger

He argues that enforced uniform messaging and censorship backfired. Real debate among scientists, and acknowledging past mistakes, are what he believes will restore public trust.

Healing From Grief & Loss | Dr. Mary-Frances O'Connor

Guest: Dr. Mary-Frances O'Connor
Date: 2025-06-02 · Duration: 2:32:36
URL: https://www.youtube.com/watch?v=inUkNZe5H3k

KEYPOINTS

1. Grief and grieving are different things
O'Connor, who directs the Grief, Loss and Social Stress Lab at the University of Arizona, treats grief as an emotion: a wave that arrives whenever you remember your loved one is gone, even 25 years later. Grieving is the process of learning to live with the loss. She compares it to the stock market: some days are terrible, but over a year there is usually an upward trajectory.

2. The 'gone but also everlasting' conflict triggers waves of grief
Attachment comes with an implicit belief: I will always be there for you, and if you are absent I should search harder. After a death, your memory knows the person has died, but your attachment system still assumes they are out there somewhere. Each time you notice those two streams conflict, a wave of grief follows. That is why absence initially makes the longing stronger, not weaker.

3. Yearning engages the brain's reward-learning region
In her imaging work, bereaved people viewed photos of their deceased loved one versus a stranger. Greater self-reported yearning correlated directly with activity in the nucleus accumbens (ventral striatum), the same dopamine-linked region involved in wanting and addiction. Memory, emotion-regulation and autonomic areas were active in everyone, but yearning varied by person.

4. Yearning is closer to thirst than to addiction
O'Connor's analogy is a desert hike without water: you think of nothing else, but nobody calls that addiction. Attachment figures are basic needs, like food and water. Part of grieving is finding new ways to meet those needs, including someone else you can say 'I will always be there for you' to, because the person who died can no longer fill that role.

5. Healthy grieving moves through protest and despair, then transmutes them
Drawing on John Bowlby's attachment work, protest is the active searching state, driven by cortisol and adrenaline. Despair is withdrawal, which conserves resources but brings inflammation and shifts in prolactin and oxytocin. Both must be acknowledged, then turned into actions that keep the person's memory while you rebuild a life. Our innate ability to shift attachment from parents to peers in adolescence suggests we are built to make this adjustment.

6. Bereavement carries real medical risk
Large epidemiological studies show all-cause mortality rises in newly bereaved people, so 'dying of a broken heart' is not just a metaphor. In O'Connor's lab, blood pressure rose for everyone during a wave of grief, and it rose most in those reporting the most intense grief. A replication in Germany found their blood pressure did not recover.

7. The stage model was a description that became a prescription
Elisabeth Kübler-Ross's 1969 work was groundbreaking in showing that grief is more than sadness. However, her descriptive interviews were later treated as a fixed sequence. Disbelief, anger and acceptance can occur together, in any order, alongside many other feelings.

8. Oscillation is the sign of healthy grieving
The dual process model of bereavement describes moving back and forth between loss-oriented time (crying, barely able to make cereal) and restoration tasks such as doing the taxes for the first time. The ability to switch between the two, not steady progress in one direction, is the marker of health. There is no way to 'optimize' grieving.

9. Most people adapt, but about 1 in 10 develop disordered grief
Bodies and minds are remarkably resilient. For the roughly one in ten whose grief shows no change over time, O'Connor says specific evidence-based psychotherapy can restore a typical grieving trajectory, so professional help is worth seeking.

10. 'If only' rumination is a form of protest
Guilt-laden stories about how the death could have been prevented are endless, and every one ends with 'and then they would have lived', which is not reality. Rumination can feel easier than accepting random tragedy, because it offers an illusion of control. But it pulls you out of the present. The better question is whether a thought is helpful, not whether it is true.

EXAMPLES

1. Progressive muscle relaxation beat mindfulness for widowed adults
In O'Connor's intervention study with widows and widowers, progressive muscle relaxation was meant to be the control condition, compared with mindfulness training and a waitlist. Mindfulness helped, but progressive relaxation helped grief even more. Participants could use it anywhere, and grieving brains may lack the bandwidth for a demanding new practice.

2. Primate mothers and the grooming rule
Observational studies show primate mothers carrying a dead infant for days to months and neglecting self-grooming. During that time, the troop's strict grooming hierarchy is suspended and anyone may groom her. O'Connor's lesson is that others should 'groom' the bereaved by prompting checkups and self-care that were neglected during caregiving.

3. Baby aspirin in the first two weeks
In a proof-of-concept study from her lab, replicated in Australia, bereaved people took low-dose aspirin for two weeks after the death and it was cardioprotective. O'Connor stresses it was not a randomized clinical trial and should not be taken as medical advice. Her point is that bereaved people should be treated as patients.

4. A beer for breakfast
The morning after her mother died, a restaurant owner in her Montana hometown offered her anything and she asked for a beer. She calls it the right tool at that moment because it let her cry with her best friend. Both she and Huberman stress that drinking to avoid feelings on an ongoing basis is harmful.

5. A widower who cried, then talked about dating
An older man in a UCLA study wept describing his wife's death two years earlier, then spoke happily about dinners with a new woman who brought out different parts of him. O'Connor uses this to show oscillation between loss and restoration.

OTHER RELEVANT

1. Try progressive muscle relaxation
Briefly tense and release muscle groups from head to toe, using free guided audio, and notice the contrast between clenched and relaxed. Practiced regularly, it becomes a portable tool for the grocery store, meetings or falling asleep.

2. Change your environment to break rumination
When you notice the 'if only' loop, physically get up and walk outside. O'Connor uses this herself. Focus on coping with the thoughts rather than answering them.

3. Support the body of a grieving person
Presence, touch, someone else in the room at night, bereavement groups, and nudges toward overdue medical, dental and mammogram appointments all matter. Support does not remove the pain, but it gives the body resources while it learns to regulate without the lost person.

4. Let difficult memories come rather than suppressing them
Avoiding images of the death can keep calling them up and suppressing them, which makes them more charged. Over time most people come to remember the life more than the death.

5. Seek help if nothing is shifting
If grief shows no change as months pass, targeted evidence-based therapy can help. Grief itself never fully disappears, and that is normal.

Behaviors That Alter Your Genes to Improve Your Health & Performance | Dr. Melissa Ilardo

Guest: Dr. Melissa Ilardo
Date: 2025-05-26 · Duration: 1:52:10
URL: https://www.youtube.com/watch?v=ijdpvG24IkE

KEYPOINTS

1. Gene expression responds to behavior and environment on several timescales
Ilardo, a geneticist at the University of Utah, describes changes that happen within minutes or hours as genes respond to stimuli, and slower epigenetic marks (molecules attached to the genome) that can be passed to children. She cites refugee populations carrying inherited marks from events their children never experienced, and famine signatures in Dutch populations. Those marks may help survival during scarcity but could be maladaptive once food is abundant.

2. Natural selection moves fastest when useful variation is already present
Most new mutations are harmful, and many produce non-viable embryos that are never seen. Waiting for a brand-new beneficial mutation can take a very long time. Rapid human adaptation usually draws on 'standing variation': differences that sit quietly until a group moves into a new environment or takes up a new behavior, such as breath-hold diving.

3. Some of the biggest human adaptations came from mixing with other groups
The Tibetan high-altitude adaptation is thought to come from interbreeding with Denisovans more than 10,000 years ago. The variant only became strongly advantageous once Tibetan ancestors moved to very high altitudes. Ilardo argues that today's globalized mixing creates gene combinations never seen before, bringing both new resilience and new disease risks. In her view humans have not stopped evolving.

4. Smell may track immune-gene differences in potential mates
In the sweaty T-shirt studies discussed, people rated the scent of opposite-sex strangers. They preferred the odor of people whose major histocompatibility complex (immune) genes were most different from their own. The proposed logic is offspring with a broader immune repertoire. Huberman notes these are not pheromone effects. The same logic explains why nature penalizes inbreeding: close relatives are more likely to share harmful recessive variants.

5. The mammalian dive reflex is triggered by breath holding with a cold face
Holding your breath with your face in cold water makes your heart rate slow and blood vessels in the limbs constrict, keeping oxygenated blood central for the brain. The spleen also contracts. Lab protocols use water at about 10 °C (50 °F) for as long as the breath hold lasts. Vagal nerve stimulation through the face appears important, though breath holding alone contributes. The reflex exists across mammals, including trained diving mice.

6. Splenic contraction releases stored red blood cells and gives about a 10% oxygen boost
The spleen acts as a reservoir of oxygen-carrying red cells, sometimes called a 'biological scuba tank'. Ilardo puts the boost at around 10% in most people. However, the spleen takes those cells back after the breath hold ends, so the boost is temporary. Spleens also contract somewhat during exercise, which may be why horses and greyhounds have large spleens.

7. The Bajau sea nomads have spleens about 50% larger than nearby farmers
Ilardo compared the Bajau of Indonesia with a nearby coastal population that farms and often cannot swim. Bajau spleens were roughly 50% larger on average, and this held for non-divers as well as divers. That points to genetics rather than training. Whether diving itself enlarges the spleen remains open: trained volunteers in other studies did show larger spleens.

8. A selected variant links higher thyroid hormone to bigger spleens and more red cells
The gene evolving in the Bajau correlates with higher-than-average (not clinically hyperthyroid) thyroid hormone levels. Europeans carrying the same variant also had higher thyroid levels and larger spleens. In mice carrying the change, spleens were larger but less dense, with higher hemoglobin, hematocrit and red cell counts. EPO levels did not change, which makes this an EPO-independent route to more red blood cells.

9. Korea's Haenyeo divers show one trained adaptation and one genetic adaptation
These all-female divers on Jeju Island have an average age of about 70 and dived in cotton suits until the 1980s, often through pregnancy. Trained divers showed an exaggerated slowing of heart rate on diving, which non-divers with the same genetics lacked. One diver dropped more than 40 beats per minute in under 15 seconds. Separately, a genetic variant lowered their diastolic blood pressure during dives.

10. Gene editing of embryos is still a blunt and ethically unresolved tool
Discussing the Chinese researcher who used CRISPR to edit babies' genomes, Ilardo notes off-target edits as a key technical problem, though the field is improving quickly. The harder question is where correction ends and enhancement begins. Some traits labeled defects are simply human variation to others, and it is unclear who would decide.

EXAMPLES

1. Blue eyes trace back to a single ancestor
Ilardo says everyone with blue eyes descends from one person in whom the change first arose. Brown was likely the original human eye color, and green arose separately in multiple people. Light eyes also tend to darken over a lifetime with UV exposure.

2. A reported 13-minute Bajau breath hold
Ilardo stresses she was told this figure by a diver's father and did not record it. Bajau divers hunt actively on the seafloor with spear guns, often below 100 feet; black coral jewelry worn as protection only grows from about that depth. Many Bajau children learn to swim before they walk.

3. Moken children see better underwater

A researcher found Moken children outperformed European children at underwater vision, largely by constricting their pupils. European children could later be trained to match them. Ilardo calls it a fallacy to conclude no genetic advantage exists just because others can be trained to the same level.

4. Haenyeo diving through pregnancy as a selection pressure

Pregnant women with sleep apnea are prone to hypertensive disorders such as preeclampsia, historically often fatal to mother and fetus. Ilardo hypothesizes, without direct proof yet, that diving apnea through pregnancy poses similar risks. That pressure, which can affect two generations at once, may explain the protective blood-pressure variant.

5. Retired Haenyeo who were over 100

A colleague at Seoul National University looking for retired Haenyeo could only find women over 100, because they rarely stop diving. Both Huberman and Ilardo caution that this is anecdote: there is no direct evidence that cold water or the dive reflex extends lifespan.

OTHER RELEVANT

1. Never practice breath holds in or near water alone

Huberman and Ilardo warn that free divers can push past the gasp reflex and then black out with no warning. Without someone to pull them up, they die. Anyone interested in free diving should learn from qualified experts under proper supervision.

2. A face-in-cold-water breath hold triggers the dive reflex at home

The lab version uses water at about 10 °C (50 °F) with a breath hold. Huberman speculates about using it for performance or immune benefits. Ilardo says no studies yet test immune effects, and the oxygen boost fades once breathing resumes.

3. Take sleep apnea seriously, especially in pregnancy

Apnea causes low blood oxygen, and in pregnancy it is linked to hypertensive disorders. Ilardo hopes that studying the Haenyeo's protective mechanism could one day lead to treatments for preeclampsia.

4. Being trainable does not mean a trait has no genetic component

Whether the subject is Kenyan marathoners, Moken vision or Bajau spleens, Ilardo argues that inherited advantages plus training can produce exceptional performers. Her caution runs in both directions: genes are not destiny, but neither is training everything.

The Science & Art of Comedy & Creativity | Tom Segura

Guest: Tom Segura
Date: 2025-05-19 · Duration: 2:17:18
URL: https://www.youtube.com/watch?v=HTJ8lDtJOg4

KEYPOINTS

1. Steady cardio clears mental clutter more than it delivers insights
Segura, who doesn't enjoy running, notices that on runs his mind drifts to people and relationships rather than producing jokes, and miles go by. Huberman agrees that long runs leave him feeling that 'a bunch of clutter just got cleared.' He describes these wordless stretches without sensory input as valuable for learning and creativity.

2. Most of the cognitive boost from long, slow exercise comes from arousal
Huberman says about 90% of the brain benefit of long, slow-distance work comes from raising alertness, which sets you up to focus afterward. High-intensity work adds other effects such as BDNF. Segura confirms it from experience. On packed days of recordings and pitch meetings, an hour-long lift beforehand leaves him in a visibly better mood and ready for everything, and skipping it makes for 'a different' day.

3. Your brain stays on standby for your phone, even during sleep
Huberman explains that the sleeping brain still tracks its surroundings. People can even answer simple math questions in sleep. Circuits queue up context-dependent behaviors like 'a magic library' rearranging its shelves. With the phone in the room, the brain keeps anticipating picking it up. That, rather than EMFs, is Huberman's explanation for why people sleep better with the phone outside the bedroom.

4. Segura captures raw ideas in voice notes, sometimes with low-dose THC
Segura has tried every capture method but often records voice memos at night, sometimes after a mild cannabis edible. He describes the right dose as letting stream-of-consciousness run and bringing 'shelved' uncomfortable thoughts to the surface. Too much tips into paranoia. Many 'brilliant' late-night recordings sound bad the next day, though some survive. Huberman notes he hasn't used cannabis in a long time.

5. A set list is a handful of single words
Segura's hour-long set list is a short column of Sharpie-written words (examples shown on camera included 'Gitmo,' 'jail,' 'teacher' and 'duck'), each cueing a worked-out bit. Some jokes follow the classic setup-and-punchline form. Others are longer stories with a 'punchline pivot.' Being around other comedians, or deep in writing a script, puts his brain in 'joke mode' all day.

6. Drop old material to keep evolving
After his 2010 album, Segura told himself, wrongly, that everyone at his shows had already heard it, which forced him to build a new hour instead of leaning on bits that 'would just crush.' He repeated this after every album, and it became the norm among comics: shoot a special, drop all of it and go back to square one. Huberman sees the same need to cut ties with your past self in every creative field.

7. Repetition burns a joke, even below conscious memory
Huberman describes HM, the famous patient with hippocampal damage who couldn't form new memories. Researchers told him a joke and he laughed, but on each retelling he laughed a little less until he found it not funny, despite having no conscious memory of hearing it. Both men connect this to the dinner-party mistake of retelling a joke, which ruins it the second time and the first time too.

8. Comedy draws people with trauma, and nightlife fuels substance problems
Segura says comedy attracts many people with traumatic backgrounds, clinical depression and severe anxiety, who often use substances to cope. Add late nights in an environment where drugs are readily available, plus the belief that substances help the art, and 'we have a lot of addicts in comedy.' Some performers recognize when it's getting in the way and quit, while others are 'too far gone.'

9. Cynicism kills funny; strong opinions fuel it
Segura argues that cynicism removes any sense that things could get better, much like refusing the 'yes, and' of improv. Complaining, by contrast, is core to stand-up: you can be funny loving or hating something, but 'I'm fine with whatever' does nothing on stage. The long-term goal for every comic, he says, is to be who you are off stage when you're on stage.

EXAMPLES

1. The Two Bears 5K at Raymond James Stadium
Segura trained by logging many slow, roughly zone-2 three-mile runs. The race in Tampa drew close to 8,000 people and turned out to include a nine-story ramp climbed repeatedly. Competitiveness ('I have to beat Bert') kept him going.

2. Huberman's running routine
Huberman runs three times a week: a long, slow Sunday run of 60–90 minutes (once 10–12 miles in graduate school, now about 6–8, sometimes with a weight vest), a faster 30-minute mid-week run, and one interval day of sprints and walks. He lifts mainly so his body doesn't hurt when he runs.

3. His wife's disgust as a signal
Segura is married to a comedian. He used to tell her that whenever she found a joke idea awful, he knew it would work on stage. They now have 'what makes this joke digestible' conversations about how to land edgy punchlines.

4. The perpetual new kid
Segura changed schools roughly every year or two from first through ninth grade and built a 'muscle' for getting people to like

him by making them laugh. He believed success would cure his insecurities. It didn't, even after specials and good pay, and he now sees that friction as fuel for his work.

OTHER RELEVANT

1. Move before demanding days

A hard workout early in a long day can raise alertness and mood for hours. For a focus boost, the arousal effect of steady cardio is the main mechanism.

2. Keep the phone out of the bedroom

Huberman's suggestion for better sleep is based on the brain's anticipation of picking up the phone, not on radiation.

3. Capture ideas fast, judge them later

Record raw ideas immediately and evaluate them in a sober, rested state. Segura's late-night 'brilliant' notes often don't hold up. If you use cannabis, he warns that the dose determines whether it loosens thinking or brings on paranoia.

4. Retire your best work to make room for new work

Segura's habit of discarding a finished hour can apply to any creative practice that risks coasting on proven material.

How Different Diets Impact Your Health | Dr. Christopher Gardner

Guest: Dr. Christopher Gardner
Date: 2025-05-12 · Duration: 2:50:28
URL: https://www.youtube.com/watch?v=9vQZT2igXN4

KEYPOINTS

1. Gardner's research points to whole foods, mostly plants
Gardner sums up his studies with Michael Pollan's 'eat food, not too much, mostly plants'. Animal foods could make up 25%, 10% or none of the diet. He stresses that the right comparison depends on the goal: weight loss, cardiometabolic markers or something else.

2. Differences within a diet dwarf the differences between diets
In the A to Z study (Atkins, Traditional, Ornish, Zone; 311 women for a year, published in JAMA in 2007), groups ended only a few pounds apart. The only significant gap was between Atkins and Zone, the two low-carb diets. In each group of about 75, some women lost 30–50 pounds and others gained 5–10, which sent Gardner looking for what predicts individual response.

3. DIETFITS found no winner and no predictor
In this NIH-funded trial, with extra support from Peter Attia and Gary Taubes' Nutrition Science Initiative, 600 people were randomized to healthy low-fat or healthy low-carb diets for a year. Average weight loss was the same, with individuals ranging from losing 60 pounds to gaining 20 in both arms. Neither insulin resistance (measured by oral glucose tolerance test) nor a three-SNP genotype pattern from Interleukin Genetics predicted who did better.

4. Both arms in a fair comparison should be the best version
Taubes told Gardner he had 'screwed up' DIETFITS by banning added sugar and refined grains from the low-fat arm. Gardner says that was the point: a fair test gives each diet its best shot. His group used the same approach for vegan vs omnivore, keto (Jeff Volek and Steve Phinney's well-formulated version) vs Mediterranean, and Beyond Meat vs pasture-raised red meat from Good Eggs in the SWAP-MEAT trial.

5. The protein RDA isn't the average requirement
The 0.8 g/kg/day figure comes from nitrogen-balance studies, including Doris Calloway's 'penthouse' metabolic ward at Berkeley, where participants (largely conscientious objectors) collected all their outputs. The RDA adds two standard deviations to the average need, so 97.5% of people meet or exceed their requirement at that intake. Gardner accepts the argument that it's a minimum rather than an optimum. Huberman questions how artificial those inactive, confined conditions were.

6. Lactose tolerance is the clearest diet–gene adaptation
Most of the world stops making lactase after weaning, so most adults are lactose intolerant. Some northern Europeans who kept dairy herds evolved to keep producing lactase into adulthood. Gardner calls this the only well-established example of a recent evolutionary diet adaptation.

7. The NOVA ultra-processed label is useful but imperfect
Carlos Monteiro's NOVA system from Brazil underlies a decade of research on ultra-processed food. Gardner notes problems with it and argues that US rules on additives such as dyes, emulsifiers and glazing agents are too loose. Changing what manufacturers do would have more impact than teaching consumers to read ingredient labels.

8. A 'protein flip' is a better frame than 'plant-based'
Gardner and Huberman both prefer the idea of moving meat from the center of the plate to the side. Gardner says his group never pushed veganism; the vegan arm in the twin study was a design requirement. He sees taste, sourcing and convenience as what will actually shift how Americans eat.

EXAMPLES

1. The Netflix twin study
The filmmaker behind 'The Cove' and 'The Game Changers' funded a study of 22 pairs of identical twins, randomizing one twin to a healthy vegan diet and one to a healthy omnivorous diet for 8 weeks: 4 weeks of delivered meals, then 4 cooking on their own. The vegans lost a little more weight and lowered LDL (the primary outcome) and fasting insulin; results were published in JAMA Network Open.

2. Epigenetic age and telomeres in 8 weeks
A separate analysis reported that the vegan twins were slightly younger by epigenetic clocks and had longer telomeres after just 8 weeks, both statistically significant though small effects. Gardner says these aren't his specialty and that the changes were nowhere near 'years younger'.

3. What happened to the twins afterwards
Asked whether participants stuck with the diet, Gardner offers only anecdotes: of four pairs he heard from, two moved toward vegetarian eating, one landed in between and one went straight back. He stresses this is 4 of 22 pairs and 'not science'. A paper on adherence is forthcoming.

4. Fermented food vs fiber (with Justin Sonnenburg)
Eighteen people ate as much fermented food as they could and 18 as much fiber, over 4 weeks of ramp-up and 6 of maintenance. The fermented group went from under half a serving to about 6 servings a day (around 300 calories) of yogurt, kefir, kombucha, kimchi and sauerkraut. Microbial diversity rose and 20 of 90 inflammatory markers improved. The fiber group saw no gain in diversity and no overall drop in inflammation.

5. Microbes nobody ate

Sonnenburg's lab characterized the fermented foods themselves and found most of the new microbes weren't in the food. Gardner's interpretation is that changing the gut environment let previously rare species bloom.

OTHER RELEVANT

1. Add low-sugar fermented foods daily

Plain yogurt, kefir, kimchi, sauerkraut and lower-sugar kombucha are the five used in the study. One bottle of kombucha is about two servings and 50 calories. Gardner adds 'low sugar' because many people picture sweetened cherry yogurt when they hear 'fermented'.

2. Judge diets by quality and by whether you'll stick to them

Healthy low-carb and healthy low-fat performed equally on average. What mattered was cutting added sugar and refined grains and eating whole foods. Pick a pattern you can sustain in the real world, without dietitians or delivered meals.

3. Treat individual predictors with skepticism for now

Neither the glucose-tolerance test nor the genotype panel predicted DIETFITS responses. Gardner points out that around 50 SNPs are linked to obesity, so testing one set doesn't rule out genetics, but no proven tool yet tells you which diet suits you.

What Pets Actually Want & Need | Dr. Karolina Westlund

Guest: Dr. Karolina Westlund
Date: 2025-04-28 · Duration: 2:05:23
URL: https://www.youtube.com/watch?v=6ck9fa6_C8c

KEYPOINTS

1. Dog breeds are slices of the wolf's predatory sequence
Westlund, an ethologist, describes the wolf hunting sequence: orient and sniff, eye and stalk, chase, grab-bite, kill-bite, dissect, eat. Over the last couple of hundred years, breeding selected different parts of it — hounds for sniffing, pointers for eyeing, others for chasing. Knowing which parts your dog was bred for tells you which behaviors it needs to express.

2. Use the 'core affect space' to judge an animal's emotional state
Plot valence (pleasant to unpleasant) against arousal. The goal is the calm, pleasant quadrant where animals feel safe and socialize. Reduce high-arousal negative states like fear and aggression, and lift animals out of low-arousal negative states (boredom, depression) with stimulating environments. Seeking, foraging, exploration, play and sex sit in the high-arousal pleasant quadrant.

3. Primate-style hugging often reads as restraint
Humans are huggers, but to many animals an embrace or a pat on top of the head is restraint and can feel like a predator's grab. Most dogs prefer the neck or upper chest. Huberman described an experiment suggesting dogs are averse to rapid petting, and slow, deliberate strokes visibly relax them. Westlund links calm handling to co-regulation, a concept from polyvagal theory.

4. 'Dominance' is usually a misused label
To an ethologist, dominance means priority of access to resources, not a dog trying to 'control' you by jumping up. Dogs stay at heel because pulling ahead was followed by something unpleasant, not because of rank. Strip the label away and most behavior has simpler explanations. Much dog training is really owner training.

5. Tail wags and head turns may encode emotion by side
Tail wagging occurs in many contexts and may spread scent from glands as well as signal visually. Wags biased to the dog's left tend to go with negative states and right-biased wags with positive ones. Cats similarly view stimuli more with the left eye in negative states and the right eye in positive ones. Dogs' facial muscles differ from ours, so whole-body language is a more reliable read than the face.

6. Tell play from fighting with 'MARS'
Meta-signals (such as the play bow), Activity shifts (chasing, pouncing, wrestling in jumbled order), Role reversals (taking turns winning, since play stops being fun if you always lose) and Self-handicapping. For example, a big dog in tug-of-war may just hold the toy against a small dog, then engage its full strength when a human pulls.

7. Cats don't bring 'gifts'
Cats carry prey to a place where they feel safe. Many perform only the grab-bite, not the kill-bite, and lose interest once the prey stops moving; movement restarts the sequence. How a cat responds to perceived threat, including from a well-meaning human, depends heavily on early social learning.

8. Wild behavior explains house problems
Covering waste likely reduces infection risk, and animals avoid eliminating where they eat, so keep the litter box well away from food. To diagnose indoor urination, mark every spot on a floor plan: edges near windows and doors suggest territorial marking, while a box linked to pain (for example, painful urination) suggests an elimination problem.

9. Neutering affects behavior as well as reproduction
More than 20 studies over the last two decades, Westlund says, suggest neutering (particularly of males, depending on age) can increase fear, reactivity, aggression and noise sensitivity, and raise the risk of certain cancers and physical problems. Rules vary: Norway bans neutering without a medical reason, while Western Australia requires it unless you're breeding. Alternatives include vasectomy or tubal ligation, which preserve hormones, and reversible chemical castration.

EXAMPLES

1. Huberman's bulldog Costello
Neutered at about six months, Costello had joint pain and fast nail growth by about age nine. Huberman began injecting 50 mg of testosterone a week, and Costello's vigor and mobility returned for roughly two more good years. Instead of criticism, Huberman received hundreds of emails from vets, many of whom discourage routine neutering unless a dog can roam and mate. He is not a vet, and says he wouldn't neuter a future male dog.

2. Cucumber versus grape
In a well-known fairness experiment, a monkey happily accepted cucumber until it saw a neighbor get a grape for the same task, then threw the cucumber back. Westlund and Huberman discussed fairness and altruism in animals while warning against reading benevolence into them.

3. Imprinting gone wrong
In some waterfowl, males learn by sexual imprinting what a female should look like, so if raised by the wrong species they court the wrong females. Westlund recalls a bottle-raised orphan duiker at an African chimp orphanage in 1995 that imprinted on humans and tried to mount her.

4. The San Francisco Zoo tiger attack
Huberman recounted Tatiana escaping her moated enclosure after visitors reportedly provoked her. She ignored the crowd

and targeted specific individuals, prompting an industry rethink of enclosures. Westlund contrasted older menageries with today's in-situ and ex-situ conservation.

OTHER RELEVANT

1. Run a consent test before petting

Scratch a spot the animal likes for a few seconds, then stop. If it leans back in or re-initiates contact, continue. If it moves away, respect the 'no thanks'. Use slow strokes.

2. Feed the predatory sequence safely

Nose work (searching for a target scent, marking it, being rewarded) is a young sport, about 15 years old, with promising early data. It seems to calm anxious, high-strung dogs and energize flat ones. Wildlife chasers can be rewarded for staying in the sniff, point and eye stages; sighthounds like greyhounds can be given safe chances to run.

3. Introduce a new cat gradually, sense by sense

Keep the cats in separate rooms and swap towels rubbed on each to exchange scent. Then let them hear each other, then see each other, and only then allow physical contact. Most species, unlike dogs, don't easily tolerate strangers.

4. Pick a dog that fits your life

Choose a breed whose predatory-sequence strengths and needs match your environment. Constant encounters with strangers in a city raise arousal in many animals.

Tools for Overcoming Substance & Behavioral Addictions | Ryan Soave

Guest: Ryan Soave
Date: 2025-04-21 · Duration: 3:07:32
URL: https://www.youtube.com/watch?v=J7yn4tJEmJU

KEYPOINTS

1. Addiction is a solution to something, and that solution becomes the problem
Soave, chief clinical officer at Guardian Recovery, sees substances and compulsive behaviors as relief from an underlying stressor. He quotes Dr. William Silkworth, an early supporter of Alcoholics Anonymous: people drink because they like the effect alcohol produces, and 'that effect is relief.' The clinical question then becomes what the person is trying to get relief from.

2. Ask whether you have it, or it has you
Clinically, the terms are substance or alcohol use disorder, rated by severity. Soave notes that not everyone who meets the criteria at one point in life is permanently an addict, though they probably shouldn't 'gamble with it.' He applies the question beyond drugs, to TV, exercise and work. Bingeing Netflix on a plane is different from bingeing to avoid a stressful day and then losing sleep.

3. Detox comes first, and early sobriety often feels worse
Treatment starts with medical and nursing assessments, and sometimes a trip to the ER, because stopping alcohol abruptly can cause seizures and death. Once the substance is gone, people have to face life without their 'medicine,' so they often feel worse at first. Soave likes it when patients arrive fighting. Like an arrow pulled further back, that tension can carry them further than patients who just tick boxes.

4. Recovery has to build a life, not just remove something
Cutting something out isn't sustainable if it was serving a purpose. Recovery means learning to notice sooner when you're out of balance and to return to peace faster, again and again. Soave borrows a definition of humility from Bill Wilson: an honest recognition of who and what we've become, followed by a deep desire to become who we can be.

5. We confuse discomfort with threat
Soave calls this possibly our biggest psychological challenge. He compares it to a sailor who assumes calm seas mean he's on course and rough seas mean he's off course, and keeps changing direction. A skilled sailor decides whether to go through a storm or around it. Distress tolerance means being able to choose a response rather than simply react.

6. Build calm proactively, before you need it
The 'gap between stimulus and response' is hard to find in the moment, so Soave schedules regulation practices whether or not he needs them that day. He compares it to therapy: the second-best time is during a crisis, and the best time is when you're not in one. Huberman adds that learning to notice the fast bodily signs of adrenaline helps you spot a stress wave earlier, as in the idea 'stilling leads to seeing.'

7. Gambling is the addiction where the next hit promises to fix everything
Someone using heroin doesn't believe the next dose will solve their life, but a gambler down $300,000 can believe one bet will. Soave says he has seen research suggesting gambling addicts have very high suicide rates. He's alarmed by unregulated offshore sites and crypto betting reaching kids, and by how saturated sports broadcasts now are with betting ads.

8. Stimulant addiction is mostly psychological, and that makes it hard
Unlike alcohol, opioids or benzodiazepines, stimulants don't require a physical detox, yet quitting them is 'really hard' because of a mental obsession. Huberman notes that smoking crack or injecting cocaine raises dopamine fastest, and that the speed of the rise matters as much as the peak.

9. Some people are 'addicted' to intensity
Soave describes special forces veterans whose training is largely nervous-system training: doing skills under extreme stress and sleep loss. At home, ordinary life can feel flat, and high-adrenaline risk-taking only brings them up to baseline. He calls it a drive and Huberman calls it intensity addiction, but both describe a nervous system calibrated very high.

EXAMPLES

1. The 30-day litmus test
Huberman admits he has worked 10–16 hours a day, five or six days a week, since he was 19. Their test is whether you could take 30 days away from something without falling apart. Soave adds that you should tell a therapist or trusted friend how it's going, because it's hard to be honest with yourself.

2. The emotional weather forecast
Each morning: (1) note gratitude, including for something that challenges you; (2) sketch the day's plans, such as school run, three flights, business dinner; (3) name your current emotional state, including fears, resentments, guilt or shame; (4) predict which 'liabilities' could flare, such as impatience or control; and (5) choose what to strive for, such as patience or kindness. Like packing a raincoat, it won't stop you getting wet, but it's there when you need it.

3. A mother changed only one thing
Between two parts of a yoga nidra training in Florida, a stressed single mother of two young boys did nothing differently except practice nidra twice a day. When she returned she said, 'my boys changed.' Soave suspects the boys were the same, and she had built the tolerance to handle ordinary boy behavior.

4. Opioids and the poppy
The same flower gives us surgical pain relief that Soave believes has saved more lives than it has cost, and heroin and

fentanyl. US overdose deaths went from about 50,000, which surpassed car-crash deaths, to roughly 100,000 a year. Teens now die from counterfeit 'Xanax' or 'Valium' pills laced with fentanyl.

5. Powerlessness as the first step

Only the first of AA's 12 steps mentions alcohol. The rest are a 'design for living.' Soave frames admitting powerlessness as like a kid who stops picking fights with the five biggest guys on the block every day: once you see where you can't win, you can find real power elsewhere.

OTHER RELEVANT

1. Schedule yoga nidra or NSDR

Soave's preferred timing for 20–35 minute sessions is morning and late afternoon, then evening, then whenever you can. His treatment programmes started each day with an hour of nidra. Regular practice makes it faster to move from a dysregulated state to a regulated one.

2. Watch for HALT

Hungry, angry, lonely, tired: these are the states that raise relapse risk, often several at once. Soave has heard anecdotally that diabetic alcoholics who keep their blood sugar stable relapse less often, and he says early research suggests GLP-1 drugs may reduce cravings, though he doesn't know of on-label use for addiction.

3. For porn or similar compulsions, define your own sobriety

Admit the problem, decide with a therapist, sponsor or group what sobriety means for you (often stopping completely), then add accountability, such as blocking software or a partner who approves the sites you visit. Huberman notes that fast, repeated dopamine spikes carve a groove and deliver less and less satisfaction over time.

4. Helping someone you love

Talk to them without shaming them, treating them as a sick friend rather than a bad person. Get support yourself through Al-Anon or a treatment center, and offer to go with them to an open 12-step meeting, which anyone can attend. You can just say 'pass' if it's your turn to share.

How to Improve Your Vitality & Heal From Disease | Dr. Mark Hyman

Guest: Dr. Mark Hyman
Date: 2025-04-14 · Duration: 2:42:21
URL: https://www.youtube.com/watch?v=UyneMnERmnI

KEYPOINTS

1. Functional medicine treats the body as one network
Hyman describes functional medicine as a systems "operating system" for biology, not just lab tests or supplements. Rather than seeking one diagnosis and dismissing symptoms that don't fit (migraines to neurology, irritable bowel to the GI doctor, a rash to dermatology), it looks at how gut, hormones, mitochondria, inflammation, insulin resistance and toxins interact. His summary: remove the impediments to health, add the ingredients, and let the body's innate healing system work.

2. His own illness shaped the approach
At 36, after a year working as a doctor in Beijing when homes were heated with raw coal, Hyman developed severe mercury toxicity. He went from cycling 100 miles a day to brain fog, chronic diarrhea, rashes, autoimmune problems, and adrenal, thyroid and mitochondrial dysfunction. Doctors offered antidepressants. Guided by Jeff Bland's systems view, he says he reverse-engineered his recovery system by system, then saw patients improve within weeks on simple diet changes while medical director at Canyon Ranch.

3. Core supplements for most people
Citing national NHANES survey data, Hyman says over 90% of Americans are low in omega-3s, about 80% are insufficient in vitamin D and over 50% lack enough magnesium. He blames depleted soils and a diet narrowed from hundreds of plant species to a few. His basics: at least 1 to 2 grams of EPA/DHA, 2,000 to 4,000 IU of vitamin D3, and a quality multivitamin with bioavailable forms, third-party tested and free of fillers or dyes such as titanium dioxide. Iodine may help people who've switched from iodized salt to sea or Himalayan salt.

4. Test, don't guess
Needs vary. Some people need 10,000 IU of vitamin D to reach the blood level others get from 1,000, because of genetic differences in vitamin D receptors. Older men shouldn't take much iron, while menstruating women may need more. Hyman argues "normal" cutoffs are too low: ferritin of 16 can still bring fatigue, brain fog, hair loss and insomnia, and he prefers vitamin D and ferritin above about 45. Lipids can shift within a month of a change. Vitamin D and iron can take about three months to rebuild.

5. ApoB beats a standard cholesterol panel
Hyman calls the total/LDL/HDL/triglyceride panel outdated and says the American Heart Association recognizes ApoB as a better predictor of heart attack risk than LDL. Insulin resistance raises triglycerides, ApoB and small LDL particle number while lowering HDL. He's not a big statin fan but calls them a tool, like a hammer when you need one.

6. The same diet can move lipids in opposite directions
One overweight, prediabetic patient on a ketogenic diet saw total cholesterol drop 100 points, triglycerides drop 200, HDL rise 30, and lost 20 pounds. A lean mid-50s athlete on the same diet saw cholesterol, LDL and particle number soar, an example of the "lean mass hyper-responder" pattern. Hyman cites Ron Krauss's particle-size work and argues for comparing yourself against your own baseline.

7. GLP-1 drugs need guardrails
Hyman says these peptides are given at doses far above what the body makes. Much of the weight lost can be muscle, and over 65% of people who stop regain weight with less muscle. He'd require nutrition (protein) counseling and strength training alongside any prescription. He also urges DEXA scans before, during and after treatment, plus kidney, liver, amylase and lipase monitoring. He cites risks that rise with time on the drug, including roughly 4.5-fold higher bowel obstruction risk at four years, plus pancreatitis, which is rare. He says many of his patients have lost 100-plus pounds without them.

8. Support your own detox pathways
For heavy metals, Hyman's sequence is to cut exposure, then boost the liver's pathways with cruciferous vegetables, garlic, cilantro juice and fiber, then add nutrients: glutathione boosters like N-acetylcysteine (he takes 600 mg daily), lipoic acid, methylating B vitamins and adequate protein. He uses silica and seaweed alginates as binders, not charcoal, and sometimes the prescription chelator DMSA under a doctor's care. Huberman takes sulforaphane.

9. Hormones are falling earlier
Hyman says sugar- and starch-heavy diets push women toward PCOS and lower men's testosterone (bigger belly, lower testosterone), and endocrine disruptors add to it. He wants young men to exhaust lifestyle fixes before testosterone replacement, given its effects on sperm count unless offset with hCG. Huberman notes he started TRT at 45 and freezes sperm yearly. Hyman recommends regular sex hormone panels for both sexes, including DHEA sulfate in women as a possible PCOS marker.

EXAMPLES

1. Food as medicine for the brain
Hyman points to ketogenic diets, long used for epilepsy, now being studied for serious mental illness, including a Mayo Clinic grant of over $3 million, alongside metabolic and nutritional psychiatry programs at Stanford and Harvard. He says Alzheimer's has multiple causes (insulin resistance, toxins, mold, Lyme, the microbiome, deficiencies). He describes an older woman with early dementia who recovered after B12 and B-vitamin treatment for methylation problems.

2. Clean air and water
Air pollution travels: Hyman says mercury from coal burning in northeast China reaches Seattle in rain. Wildfire smoke from

burning homes adds chemicals like PFAS. He recommends a home HEPA filter where you spend the most time and changing HVAC filters. He avoids unfiltered tap water, citing dozens of wastewater contaminants on average including drugs, pesticides and hormones, and favors reverse osmosis filtration.

3. Eating well on a budget

Hyman calls the idea that health is expensive a myth. Sleep, breathing, bodyweight exercise and real food cost little. He grew up eating chicken liver and borscht made with cheap short ribs and cabbage, and cites estimates that eating well costs about the same or roughly 50 cents more a day. He recommends the Environmental Working Group's "Good Food on a Tight Budget" guide.

4. Lower-mercury fish

The bigger the fish, the more mercury, so Hyman rarely eats tuna. He favors "SMASH" fish: small wild salmon, mackerel, anchovies, sardines and herring.

OTHER RELEVANT

1. Magnesium forms matter

Magnesium oxide is poorly absorbed. Citrate works as a laxative, malate is often used for muscles, and glycinate and threonate are favored for brain and sleep, with glycinate unlikely to cause loose stools. Methylated B12 is mostly safe but depends on dose and genetics, since you can over- or under-methylate.

2. Peptides, with caveats

Hyman mentions PT-141 (FDA-approved as Vyleesi for low sexual desire in women; he says it works in men but can cause nausea), BPC-157, TB-500 and GHK for tissue repair, and thymosin alpha-1 for immune support as the thymus shrinks with age. Both stress cycling, physician oversight and safe sourcing. Huberman worries that continuous BPC-157 use promotes blood vessel growth, which could feed an undetected tumor.

3. Screening and NAD

Hyman favors broad early detection, including the Galleri cell-free DNA blood test (he cites about 50 cancers screened, a roughly 0.5% false-positive rate and about 75% accuracy) and whole-body MRI, and expects costs to fall. Note that he leads a testing company. Huberman cites UCSF neurosurgeon Eddie Chang seeing tumors and aneurysms caught by scans. Huberman takes sublingual NMN daily and notices more energy and faster hair and nail growth. Hyman uses NAD to activate sirtuins, which are involved in DNA repair.

Transform Your Mental Health With Diet & Lifestyle | Dr. Chris Palmer

Guest: Dr. Chris Palmer
Date: 2025-03-31 · Duration: 3:12:02
URL: https://www.youtube.com/watch?v=hCyvqRq5YmM

KEYPOINTS

1. Metabolic psychiatry revives a century-old idea
Palmer notes that researchers from the 1800s into the 1960s measured lactate, glucose and other metabolic markers in people with schizophrenia and bipolar disorder. Psychiatry then focused on neurotransmitters, while other researchers split into psychological and social camps. His framework brings these back together. Biological, psychological and social factors all act on metabolism, in different combinations for different people.

2. Mitochondria do far more than make energy
Mitochondria turn food and oxygen into ATP; if that process stops, a person dies within about six minutes. Research over the past 25 years shows they also help make neurotransmitter building blocks, store GABA, and guide the release of neurotransmitter vesicles at synapses, which does not happen when mitochondria are removed even if ATP is supplied. They also switch inflammation on and off, carry out the first and last steps of cortisol synthesis and the first step of all steroid hormones (estrogen, testosterone, progesterone), and are major regulators of gene expression.

3. Depression is not just a 'missing molecule' problem
Huberman lays out two common models: a deficiency of serotonin or dopamine, or treatments that open a window for neuroplasticity. Palmer calls metabolism and mitochondrial function an umbrella over both, because mitochondria govern how neurotransmitters are made and released and how target cells respond to them. The first antidepressant, the MAO inhibitor iproniazid, was discovered when tuberculosis patients became less depressed.

4. Childhood adversity shows that mental and physical health are linked
Adverse childhood experiences raise the risk of essentially every psychiatric diagnosis, including PTSD, ADHD, psychosis, mood disorders and substance use. They also raise the risk of obesity, type 2 diabetes, heart disease, autoimmune disease and dementia. People with six or more ACEs live on average about 20 years less than people with none. Palmer argues that metabolism and mitochondria are the only thread that connects all of these outcomes.

5. Stimulants help or harm depending on dose
People with ADHD show reduced glucose metabolism in the brain, and appropriate, usually low doses of stimulants raise dopamine and brain metabolism enough to ease symptoms. Overstimulated mitochondria leak electrons from the electron transport chain, producing reactive oxygen species that damage mitochondria and cells and can cause chronic dysfunction. Palmer says this may help explain later heart deaths among heavy cocaine and amphetamine users.

6. The ketogenic diet is a proven anticonvulsant with growing psychiatric evidence
The diet is a 100-year-old evidence-based treatment for epilepsy, supported by more than a dozen controlled trials and two positive Cochrane reviews. In treatment-resistant epilepsy it is six times more likely to bring seizure freedom than trying another drug. More than 50 pilot trials, case series and case reports covering over 1,900 people with schizophrenia, bipolar disorder, depression, anxiety or anorexia suggest benefit, sometimes remission. Palmer stresses it mimics fasting and is an intervention, not the healthiest diet for everyone.

7. Lifestyle comes before any supplement
Palmer's six pillars of lifestyle medicine are diet, movement, sleep, managing substance use, stress reduction, and relationships including purpose. Endurance athletes' muscles differ from untrained muscles mainly in the number and health of their mitochondria. He says no supplement 'stands a chance in hell' of undoing a harmful lifestyle, noting that one-third of US adults sleep too little and about 60% of what Americans eat is ultra-processed. Severe illness may need more than lifestyle changes.

8. Common nutrient deficiencies affect mitochondria and mood
Vitamin B12, folate and iron are essential to mitochondrial function. A JAMA study found about 40% of US females aged 12–21 were iron deficient, which Palmer links to the sharp rise in mental illness in girls after puberty, alongside psychosocial causes. B12 deficiency, which affects about 50% of mostly vegetarian India, can cause depression, psychosis or delusions and permanent nerve damage. Metformin and oral contraceptives both impair B12 absorption.

9. Parents' metabolic health affects their children's neurodevelopment
In a meta-analysis of over 3 million people, maternal obesity roughly doubled autism risk and maternal diabetes doubled it, while both together quadrupled it. Paternal obesity also doubled risk, which Palmer says is far larger than the effect of older fathers. Only about 7% of Americans are healthy on all five metabolic-syndrome markers: waist size, blood pressure, glucose, triglycerides and HDL. People who look thin can still be metabolically unhealthy.

EXAMPLES

1. Ian Campbell's bipolar ketogenic pilot
In a UK trial, 20 patients with bipolar disorder on a ketogenic diet showed wide-ranging metabolic improvements in weight and blood pressure and reduced brain glutamate, which is linked to hyperexcitability. Palmer reads this as metabolism and neurotransmitters working together rather than as competing explanations.

2. Creatine as a phosphate shuttle
Creatine joins ATP inside mitochondria to form phosphocreatine and carries energy to synapses and ribosomes. It comes only from animal foods. Vegans and people with schizophrenia, depression or Alzheimer's tend to have lower brain levels. Small studies are promising, but Palmer does not yet routinely recommend it because large trials have not been funded.

3. Methylene blue's caution

It is an off-patent electron acceptor and donor that may limit electron leakage and oxidative stress, and may support mitochondrial biogenesis. Palmer has not used it with patients. It can cause serotonin syndrome, sometimes fatal and often mistaken for anxiety or panic, especially with serotonergic drugs. It can also stain teeth, and quality of supply matters.

4. Urolithin A trials

Palmer credits the company Timeline for well-designed randomized trials. In people over about 55–65, roughly eight weeks of urolithin A improved muscle mass, performance and aging-related biomarkers. He considers it reasonable to try, but only on top of diet and exercise.

5. Fasting and the Women's Health Initiative

Valter Longo's plant-based fasting-mimicking diet of about 600 calories a day, done in 5-day cycles a few times a year, improved many health biomarkers. By contrast, the large Women's Health Initiative low-fat trial found no benefit over the standard American diet, which leads Palmer to say low-fat dogma should go.

OTHER RELEVANT

1. Get B12, folate, iron and metabolic markers tested

Vegans and vegetarians, people on metformin or the pill, and menstruating teens are higher-risk. Palmer suggests at least annual checks, along with blood pressure, glucose, triglycerides and HDL, even if you are not overweight.

2. Treat ketogenic therapy as medical treatment

For schizophrenia, bipolar disorder or treatment-resistant depression, ketogenic therapy can change lives, but some patients come off medications at the same time. Do it with clinicians, not alone.

3. Before conceiving, work on metabolic health

Given the obesity and diabetes data for both parents, improving diet, exercise and sleep before pregnancy is a modifiable way to lower the risk of neurodevelopmental disorders in children.

4. Vaccines and infection both carry inflammatory risk

Palmer says vaccines raise inflammation, which in rare hyper-responders could affect neurodevelopment, as in a court case involving a child with a known mitochondrial disorder. He also notes that existing studies find unvaccinated children more likely to develop autism, plausibly because severe infections like measles harm mitochondria too, while criticizing what those studies controlled for. Good sleep and nutrition may support a child going into vaccination.

How to Improve Your Teeth & Oral Microbiome for Brain & Body Health | Dr. Staci Whitman

Guest: Dr. Staci Whitman
Date: 2025-03-24 · Duration: 2:54:46
URL: https://www.youtube.com/watch?v=_oOEKKiwdDE

KEYPOINTS

1. Teeth are constantly losing and regaining minerals
Every time you eat, salivary amylase starts digestion and mouth pH drops, leaching calcium and phosphorus from enamel. Saliva, which carries minerals, enzymes and immune cells, then buffers the acid and puts minerals back. Whitman points to the Stephan curve: the mouth swings acidic and back to neutral across the day, and a small lesion that has not yet cavitated can remineralize if given the chance.

2. How often you eat matters as much as what you eat
Saliva begins buffering roughly 20 to 30 minutes after eating, and Whitman says full remineralization needs about two hours without food or caloric drinks. Constant snacking, grazing and sipping sweet coffee drinks keeps the mouth acidic all day. She treats time-restricted eating or simply eating on a schedule as a practical anti-cavity tool, and asks cavity-prone patients about frequency, not just sugar.

3. Flour behaves like sugar in the mouth, and stickiness is the problem
Cavity-causing bacteria ferment both sugar and refined flour and release acid. Dry, sticky, hyper-palatable foods such as crackers, chips, pretzels, toast and granola bars lodge in grooves and between molars, so the acid sits against enamel for hours. That is why she sees children with eight cavities, often between the back teeth.

4. Harsh mouthwash can undercut cardiovascular health
Bacteria on the back of the tongue reduce dietary nitrate to nitrite, a precursor of nitric oxide, which supports vasodilation and immune function. Whitman cites studies showing that habitual use of strong antimicrobial rinses, including alcohol-based products and prescription chlorhexidine, damages these bacteria and can raise blood pressure. Persistent bad breath, in her view, signals dysbiosis worth investigating rather than something to carpet-bomb.

5. Bleeding gums open a route into the bloodstream
She calls it 'leaky gums': inflamed, bleeding tissue lets oral pathogens and their endotoxins into circulation, provoking inflammation elsewhere. She names red-complex bacteria such as P. gingivalis, T. denticola and F. nucleatum, plus Aggregatibacter (AA) and Strep mutans. She cites links between gum disease and roughly twice the cardiovascular risk and three times the stroke risk, while acknowledging that much of this evidence is correlational.

6. Mouth breathing reshapes the mouth and the face
Breathing through the mouth dries out saliva and lowers pH, raising decay risk on its own. Whitman, drawing on the book Jaws by Sandra Kahn and Paul Ehrlich, argues that softer modern diets and less chewing (ancestral humans may have chewed up to four hours a day) and less breastfeeding mean narrower jaws, crowded teeth and airway problems. She urges airway screening for children.

7. Gum disease is linked to fertility outcomes
She describes associations between periodontal pathogens and reduced sperm motility in men, and in women about two months longer to conceive, plus higher risk of preterm and low-birth-weight births. The proposed mechanism is the same bacterial translocation and inflammation.

8. Fluoride works topically, so swallowing it adds risk without clear benefit
Whitman says the old idea that ingested fluoride strengthens developing enamel has been largely abandoned. The benefit is mainly topical. She describes the 2024 federal ruling by Judge Edward Chen ordering the EPA to address fluoridation, after a National Toxicology Program review linked higher exposure with lower IQ in children. She notes that critics point out many studies used 1.2 to 1.5 mg/L versus the U.S. level of 0.7 mg/L, and that total intake varies with water consumption, cooking, processed foods and some medications. She frames it as a personal-choice issue, and Huberman notes this is contested.

9. Hydroxyapatite toothpaste is her preferred alternative
Hydroxyapatite is the mineral enamel is made of, and she and Huberman both use it. It also brightens teeth by changing how light reflects from the surface, unlike peroxide bleaches that penetrate the tooth and can disturb the microbiome. Whichever toothpaste you use, spit but don't rinse vigorously, so the active ingredients stay on the teeth.

10. Nicotine pouches and gum carry oral costs
Nicotine is a vasoconstrictor. Whitman reports seeing gum recession, bone loss and leukoplakia (white, potentially precancerous patches) in pouch users. If you use them, she says to know the risks and keep regular dental checkups so early changes are caught.

EXAMPLES

1. The three-minute test before mouth taping
Before taping your mouth at night, check you can breathe calmly through your nose for three minutes, timed, with water held in your mouth or a strip of tape on your lips. Then build up: five minutes while chopping vegetables, 30 minutes during a show, a two-hour movie, then overnight. Children should be screened by an airway-focused dentist or ENT first. Whitman counts taping among the best things she has done for her own sleep data.

2. Xylitol gum after a snack
When a child, or adult, has just had crackers or chips, a piece of xylitol gum loosens trapped food, stimulates saliva and

suppresses Strep mutans. She is wary of tough mastic gum because heavy chewing can strain the jaw joint.

3. Waiting before you brush

Brushing immediately after eating or vomiting scrubs softened enamel and can cause sensitivity and recession. Wait 20 to 30 minutes; after vomiting, rinse with a little baking soda in water instead.

4. Reading saliva at home

Thick, ropy saliva suggests dehydration; watery saliva is healthy. Adding a pinch of salt or electrolytes to water, plus nasal breathing, helps keep saliva abundant, which matters especially for older adults and anyone with dry mouth from medications or cancer treatment.

5. A hydrogen peroxide cautionary tale

Huberman describes gargling with half water, half hydrogen peroxide on an acupuncturist's advice and developing a nickel-sized canker sore days later. Whitman says peroxide rinses will whiten but disrupt the oral microbiome and should be used sparingly. Mouth ulcers can also stem from sodium lauryl sulfate (SLS) or its derivatives in toothpaste.

OTHER RELEVANT

1. Daily routine she recommends

Soft brush with gentle circles twice a day; floss at least once, ideally before bed; a water flosser if you can; no alcohol-containing mouthwash; minimally processed foods; good hydration and sleep; and adequate minerals and fat-soluble vitamins.

2. Tongue scraping and oil pulling

A tongue scraper removes the bacterial film better than a toothbrush and can improve taste; a white coating can signal dysbiosis or candida. Scrape gently, since helpful nitrate-reducing bacteria live deeper in the tongue's crevices. Oil pulling with coconut oil a few times a week, not daily, adds mild antimicrobial action; spit it in the trash, not the sink.

3. Coffee is fine

It dries the mouth and stains, so counter it with water and regular cleanings.

4. 'Kiss the sky' for the airway

Huberman shares a neck exercise opera singer Renée Fleming suggested to him: look straight up and pucker for about 15 seconds per side to train the internal neck muscles, which he finds makes deep nasal breaths easier. This is a personal practice, not something Whitman studied.

How to Increase Your Speed, Mobility & Longevity with Plyometrics & Sprinting | Stuart McMillan

Guest: Stuart McMillan
Date: 2025-03-17 · Duration: 3:01:06
URL: https://www.youtube.com/watch?v=U3cSnzdyyXU

KEYPOINTS

1. Sprinting is the purest test of human performance
McMillan, who has coached since 1984 and professionally since 1992, argues the fastest person on Earth really is the fastest. There's unlikely to be an undiscovered Usain Bolt, whereas the world's best linebacker may never have played. An NFL player might perform at about 80% of their best each game, but at less than 99.9% on a 100-meter start line, forget it. He prefers coaching the 200 for its tactics. Bolt's 9.58-second world record took about 40 steps.

2. There are about five gaits, and speed dictates your foot strike
Walking (usually heel-to-toe, up to roughly 2 to 2.3 meters per second), jogging, running, striding and sprinting each have an inverted-U of efficiency. You self-organize toward your most efficient speed and pattern within each one, then switch gaits when it breaks down. McMillan's cue is simply "flat-foot contact": at walking speed that produces a heel roll, and at sprint speed a slightly pointed foot landing more toward the toes. Don't consciously heel- or toe-strike unless a coach is fixing a specific problem.

3. Most adults can no longer sprint safely
Few people sprint past their 20s, and almost no one in their 30s. Our cardiovascular "engine" outlasts our tissues' and joints' ability to handle sprint forces. An all-out 50 meters after a short warm-up often ends in a pulled hamstring or calf. Most people can't go above about 75% of their capacity safely. McMillan's two substitutes are hill sprints, which stress tissue less, and above all skipping.

4. Skipping trains what sprinting trains
Skipping loads tissues and coordination patterns similarly to sprinting. It's plyometric, works the springiness of connective tissue, demands cross-body coordination, and drives "knee behind butt" hip extension, which commuting and sitting erode. McMillan skips 20 minutes every morning on the road and has skipped 10 miles. He urges skippers to be tall, expressive, rhythmic and stiff on the ground, the opposite of a closed, shuffling jog.

5. Eccentric force capacity separates elite performers, and older adults lose it first
From testing hundreds of athletes at the Canadian Sport Centre in Calgary starting in 1994, McMillan found concentric force measures didn't distinguish elite from sub-elite performers in almost any sport, while eccentric (braking) capacity did. Elite sprinting is essentially all braking forces. The same eccentric control is what keeps older people from falling off a curb, which Huberman connects to Peter Attia's point that falls often start a fatal decline.

6. Sprinting is a two-mass system
Jogging and striding work like a simple spring and mass. McMillan cites his friend Dr. Ken Clark's research showing that in true sprinting, the shank and foot act as a second mass, contributing up to about 8% of ground-contact force. Only athletes who can move their limbs fast enough get this. He says nearly every elite sprinter can, but only about a dozen NFL players.

7. Three sprint non-negotiables: high knees, stiff springs, hip extension
Elite sprinters' knees rise to about belly-button height, putting the action in front of the center of mass. On contact the foot and ankle must be rigid, like a boxer's fist on a heavy bag: both apply more than five times body weight in under three-hundredths of a second. McMillan judges a hip-extension pattern on five qualities: force, velocity, range of motion, control and repeatability.

8. Let the torso lead the eyes
In sprinting, lifting the eyes first raises the chin and throws the spine into hyperextension, so you push down the track instead of bouncing. McMillan's cue is to let the torso decide when the chin and eyes come up. Huberman says the same principle (chest and hips moving together, head last, and pushing your feet into the floor rather than pulling the bar) improved his squats and deadlifts.

9. Don't copy Usain Bolt
Movement is governed by what you're moving: limb ratios, tendon length, joints, fiber type and mobility. McMillan identifies an athlete's action capabilities, applies the known non-negotiables, and individualizes the rest instead of imitating a 6-foot-5, 215-pound outlier.

EXAMPLES

1. Spotting a sprinter by sound
Watching kids run around the Malibu High School track after school, McMillan picked out one boy as a sprinter. Despite flailing limbs, he made a sharp "pop" against the ground, like a good boxer on a heavy bag, while the others thudded. McMillan says he usually hears it before he sees it. He says the best athletes in every sport make it look easiest.

2. Andre De Grasse versus Ben Johnson
When McMillan began coaching De Grasse in 2015, he could barely squat his body weight or clean 60 kg, yet eight months later he won three Olympic medals. Ben Johnson reportedly squatted 600 pounds days before his 9.79 in 1988, later stripped for doping. Speed comes from force, rate, direction and mass in many combinations. Past a threshold, more strength (say from 385 to 405 pounds in the squat) won't make you faster.

3. McMillan's father's routine

A former elite athlete, his father ran the 2019 New York City Marathon in about 5:02 at roughly 73 or 74. At 78 he runs four days a week, 20 to 25 miles, and two of those days are cycles of walking, skipping and all-out striding, 30 seconds each.

4. Contaminated supplements and drug-testing tragedies

McMillan recalls bobsledder Pavle Jovanovic, who tested positive for nandrolone around 2001, which was later traced to a supplement at a time when some companies spiked protein with steroids. It ruined his career and he later took his own life. McMillan believes doping in track is far rarer than people assume, and that the public overestimates what drugs contribute at the elite level.

OTHER RELEVANT

1. How to start skipping

Don't begin with a 10-minute skip. Alternate 30 seconds of skipping with 30 seconds of jogging or walking. A simple on-ramp: jog about a mile as usual, then switch between skipping and jogging every 30 seconds or so. Progress to more powerful skips that drive the thigh up and back, or skips for distance, such as counting the steps to a tree 50 meters away.

2. Build toward strides

Strides come before sprints. Skipping, hills and strides let you work up to near-maximal speed safely. Both men favor sessions that leave you feeling energized, with better posture and sleep, over leaving it all on the mat, especially for people with stressful lives. McMillan suggests the ability to safely express your maximal speed may be the best single measure of vitality.

3. Testosterone and peptides

Huberman notes many young men take testosterone they don't need, which shuts down sperm production unless offset with something like HCG and could do lasting harm while the brain is still developing. He says he got good results without it until his mid-40s, with subtle but meaningful effects from supplements such as Tongkat Ali that he confirmed in blood work. Athletes should check their governing body's rules before taking anything.

Improve Focus with Behavioral Tools & Medication for ADHD | Dr. John Kruse

Guest: Dr. John Kruse
Date: 2025-03-10 · Duration: 2:38:06
URL: https://www.youtube.com/watch?v=NtQ-kdLlQiU

KEYPOINTS

1. ADHD is defined by ordinary behaviors taken to a disruptive extreme
The diagnosis rests on 18 symptoms, nine inattentive (losing items, failing to follow through, distractibility) and nine hyperactive-impulsive (interrupting, blurting, fidgeting). Adults need at least five, present to an excessive degree, causing distress or dysfunction, and showing up in multiple areas of life. Psychiatrist John Kruse notes the old belief that children outgrow it is wrong; most do not, and symptom severity fluctuates across adulthood.

2. Strongly genetic, but highly sensitive to structure and demands
Heritability is around 0.8, comparable to height. Kruse frames ADHD as an executive-function problem affecting working memory, selective attention, emotional regulation and impulse control, so the brain relies more on outside structure. Structure is a Goldilocks issue: assembly-line work is too rigid. Working from home during COVID cut structure while raising demands, a perfect storm for symptoms.

3. Build the day around four essentials before any tasks
Kruse asks patients to schedule sleep, regular meals, exercise or movement, and relaxation time first, framing the scheduler as a nurturing 'mother hen' rather than a taskmaster. Forgetting to eat is common enough that a patient saying 'it was 4 p.m. and I hadn't eaten' is a clue to him, possibly reflecting weaker attention to internal body signals.

4. Sleep timing matters as much as sleep duration
People with ADHD lean toward night-owl chronotypes, partly through over-represented genetic markers and partly through procrastination. Kruse, who did his PhD on circadian rhythms, says a late schedule such as 2 a.m. to 10 a.m. is fine if it is consistent. Paradoxically, stimulant medication helps many patients regularize sleep, perhaps through a daytime anchor or an evening wind-down.

5. Most insomnia is an arousal system that will not switch off
Kruse cites sleep research suggesting that in at least 90% of insomnia the sleep system is intact; the daytime wake system fails to disengage. So the goal is to remove arousal: plan a bedtime, avoid late exercise that raises body temperature, keep the phone out of the bedroom entirely, and recruit a partner for agreed-upon reminders that do not feel like nagging.

6. Childhood stimulant treatment appears to lower addiction risk
Roughly 20% of Americans develop a substance problem; for people with ADHD the rate is almost double, near 40%, and higher in men. Several large meta-analyses, though not every study, find that treating children with stimulants largely normalizes that risk, perhaps by reducing impulsivity and helping them absorb information about drugs.

7. Amphetamines are the most effective medications; methylphenidate is closer to the rest
Amphetamine blocks dopamine and norepinephrine reuptake and also forces larger release from vesicles. Kruse argues methylphenidate (Ritalin) mainly blocks reuptake, like bupropion, and its efficacy sits nearer non-stimulants such as atomoxetine and guanfacine. Unlike antidepressants, ADHD drugs show a more linear dose-response relationship.

8. Amphetamine-induced psychosis is rare but serious
Kruse puts the risk near 1 in 500, likely dose-dependent. Unlike alcohol intoxication, the paranoid, schizophrenia-like state can persist for weeks or months after stopping, and about 20% of affected people remain psychotic 20 years later. In his San Francisco practice the rate exceeded 1 in 100, which he links to HIV and methamphetamine histories. With any personal or family history of psychosis, including a cannabis-triggered episode, he would not prescribe an amphetamine.

9. Cardiac risk is small for most people
Stimulants raise heart rate and blood pressure a few points on average, with roughly 80% showing no change. Sudden death is tied to rare inherited conduction problems, usually flagged by family history or fainting. A recent meta-analysis following people up to 14 years found a statistically significant rise in cardiovascular risk, mostly in the first three years, but the absolute risk stayed very low. Kruse favors careful histories over routine EKGs for everyone.

10. Non-stimulant options work differently
Guanfacine, an alpha-2 agonist originally for blood pressure, appears to strengthen prefrontal synaptic connections (work associated with Amy Arnsten's lab at Yale) and takes two to four weeks. It is sedating, so Kruse uses cheap immediate-release doses at bedtime; it causes less rebound hypertension than clonidine when doses are missed. Modafinil and armodafinil promote wakefulness with less agitation, though 10 to 15% of people feel revved up for the first few days.

EXAMPLES

1. Nicotine and caffeine as self-medication
Kruse says nicotine improves some executive functions and, unusually, both alerts and calms; a few patients prefer gum to any medication, though clinical trials are lacking and smoking, vaping and chewing are harmful. Caffeine is a weak stimulant at typical doses, and dosing is unreliable: a University of Florida study found a threefold difference in caffeine content in the same Starbucks drink over three weeks. Caffeine plus L-theanine has limited supportive data.

2. Fish oil dosing
Evidence for omega-3s is most consistent for depression, where Kruse suggests about 1,000 mg of EPA daily, doubling if benefit seems incomplete; a mania trial used up to 7,000 mg. ADHD studies in children are mixed. Because the brain is rich in DHA, he prefers products near nature's 2:1 EPA-to-DHA ratio over EPA-only formulas. Huberman takes 1 to 2 g of EPA

daily.

3. Cyclic sighing at bedtime

Kruse counts about 20 to 25 slow cyclic sighs (roughly five minutes, long exhales) instead of using a timer, which could rouse him. It helped him fall and stay asleep after two decades of insomnia. Huberman reports nighttime waking to urinate dropped from nightly to about four times in 18 to 20 months.

4. Vyvanse's built-in slow release

Lisdexamfetamine links dexamphetamine to the amino acid lysine; red blood cells cleave it at a limited rate, so it enters and leaves smoothly and is inactive if snorted. Higher doses mostly extend duration rather than raise the peak. Immediate-release stimulants allow flexible timing but often bring an afternoon crash in energy and mood.

5. Lateness that does not feel like lateness

People with ADHD estimate elapsed time inconsistently in lab tests. One patient insisted she was never late, arriving at 9:15 or 9:20 for a 9:00 start, which shows why symptom checklists need context.

OTHER RELEVANT

1. Use one consolidated task list, triaged A, B, C

ADHD-adapted CBT, developed independently by groups including Mary Solanto and Steven Safren with Russell Ramsay, centers on daily schedule blocks plus a single list. A items are urgent and important, B important but less urgent, C everything else, which resists the pull toward easy, crossable chores.

2. Lock away distractions

If willpower fails, use blocking apps, then physical lock boxes. Huberman keeps social media on a separate old phone. Brain-training games and neurofeedback lack convincing real-world evidence; FDA clearance of a device mainly shows it is safe.

3. Drug holidays mainly matter for growth

Stimulants reduce adult height by about 2 cm; breaks of several months, such as summers, appear to offset that. Kruse sees no evidence that weekend breaks reduce tolerance or addiction.

4. Morning bright light may help

One or two studies found early bright light improved ADHD symptoms even without depression, possibly by resynchronizing body clocks.

How to Achieve Inner Peace & Healing | Dr. Richard Schwartz

Guest: Dr. Richard Schwartz
Date: 2025-03-03 · Duration: 2:13:08
URL: https://www.youtube.com/watch?v=KuuoLT-fq4s

KEYPOINTS

1. The mind is naturally made of parts
Schwartz, who developed Internal Family Systems (IFS) about 41 years ago, assumes everyone has multiple sub-personalities, not in a diagnostic sense. We are born with these parts and they are valuable, but trauma and attachment injuries force them into extreme roles. Frozen in time, they behave as if the original trauma is still happening.

2. IFS began with bulimic clients who described an inner family
Trained as a family therapist, Schwartz tried in about 1983 to cure bulimia by reorganizing patients' families and failed, because the clients kept bingeing and purging. When he asked why, they described a critic that attacked them, which hit a part that felt empty and worthless, which triggered a binge part to rescue them, followed by more criticism. That circular sequence looked like the dynamics he studied in real families.

3. A bad event is not traumatizing unless we exile the hurt part
In Schwartz's view, if you go toward the part that got hurt, embrace it and help it unload the feelings, you are not traumatized. Trauma comes from locking away our most sensitive parts because others say 'just move on.' The more exiles you carry, the more delicate you feel and the more dangerous the world seems, because anything can trigger them.

4. Managers try to prevent triggers; firefighters put out emotional fires
Managers keep life under control: perfectionists, inner critics trying to make you look good, and caretakers who tend to everyone but you. When an exile breaks through, firefighters react impulsively regardless of collateral damage, through addiction, dissociation, bingeing or rage. Schwartz stresses these are roles, not essences; the critic is not just an internalized parent's voice but a part desperately trying to protect you.

5. There are no bad parts, only parts in bad roles
Firefighters often form a hierarchy, and for many people suicide sits at the top as a comforting exit plan. Rather than fearing a suicidal part, IFS asks what it fears would happen if it did not act. The answer is usually that the pain would be too much. If that pain can be unloaded, the part often transforms into one that wants to help you live. Addictive parts get the same curious treatment.

6. The Self, with a capital S, is beneath every part
When parts step back, clients spontaneously report curiosity or compassion toward a critic and say 'that's not a part, that's me.' Schwartz finds this Self in everyone and defines it by eight C's: curiosity, calm, confidence, compassion, courage, clarity, creativity and connectedness. In IFS the Self is not a passive witness but an active inner and outer leader.

7. Localizing feelings in the body bypasses the thinking part
Directing questions to a sensation's location and waiting for an answer to come from there keeps clients out of the narrating mind, which often thinks it is supposed to run the therapy. Highly cognitive people can do IFS, but the thinking part must first be persuaded to step out long enough to feel the body.

8. Protectors often create what they fear
An overly protective stance provokes protectors in others, escalating conflict. Compassion for your own judgmental part lets you see the exiles driving other people's protectors without becoming more vulnerable; the Self can still be forceful. Schwartz says many people choose bad partners because a part carrying worthlessness from parental rejection seeks redemption through someone similar, a theme from his book You're the One You've Been Waiting For.

9. Ketamine can quiet managers and speed IFS work
Schwartz had just completed an IFS and ketamine retreat with 32 leaders and says IFS is now a primary model in psychedelic therapy. Ketamine, the legal option, often puts manager parts to sleep, so in 15 minutes afterward he can do what might take five sessions. A so-called bad trip can be reframed as a terrified exile seeking attention. Huberman cautions that young people should avoid psychedelics, that psilocybin and MDMA remain illegal, and that unsupervised use can cause serious problems.

EXAMPLES

1. Huberman's titanium teddy bear
Recalling a high-friction conversation with a close family member, Huberman located his frustration between his midsection and forehead as a pressure the size of a teddy bear. When asked to get curious rather than dislike it, it softened and moved. Schwartz mapped two polarized firefighters: one protecting the relationship and one judgmental part it kept at bay, plus probably a younger part holding a fantasy of what the relationship should be.

2. Legacy burdens in conflict zones
Schwartz describes inherited extreme beliefs and emotions passed down through ancestors, and runs training programs in the Middle East. He envisions large-group unburdening of Holocaust-related burdens on one side and Palestinian burdens on the other. In couples work he calls timeout and asks each person to speak for their parts, not from them.

3. Work as a firefighter against fear of death
Huberman describes 80 to 85 hour work weeks and finding, through IFS-style questioning, that the workaholic part feared annihilation, ultimately a fear of death that surfaces at the edge of NSDR. He has since cut hours and chosen meaningful projects, learning from his bulldog to savor slowing down.

4. Schwartz's own worthlessness

The oldest of six boys with undiagnosed ADD, Schwartz was called lazy and worthless by his physician-researcher father. A part driven to prove him wrong built IFS through humiliation at psychiatry grand rounds, along with a part that closed his heart, which later did not serve him as a community leader until students confronted it.

5. A retracted MDMA neurotoxicity paper

Huberman notes that a high-profile Science paper reporting MDMA neurotoxicity in non-human primates was retracted after it emerged the animals had been injected with methamphetamine, a retraction that received little press.

OTHER RELEVANT

1. A self-guided protector exercise

Pick a protector, such as a critic, overworker or caretaker. Find it in or around your body and notice how you feel toward it; ask any parts that dislike or fear it to relax. Then ask: what do you want me to know? What are you afraid would happen if you stopped? Thank it for trying to protect you. Ask what it would do if freed, how old it thinks you are, updating it if wrong, and what it needs from you. Schwartz says not to do this if it frightens you, and that a therapist is needed to heal exiles.

2. Make it a daily check-in

One session reverses if you drop it. Each morning Schwartz checks how the parts he is working with are doing and what they need; through the day he notices whether his heart is open and mind curious, treating any departure as a protector showing up.

3. Use quiet states, carefully

On waking, before managers come online, Huberman keeps his eyes closed and explores what surfaces. Schwartz agrees that sleep, breathwork and psychedelics put managers to sleep; cyclic hyperventilation should never be done in or near water.

4. Notice what devices are helping you avoid

Schwartz argues constant phones and busyness feed distractor parts and leave exiles further behind, which is why many people fear having nothing to do.

How to Enhance Your Immune System | Dr. Roger Seheult

Guest: Dr. Roger Seheult
Date: 2025-02-24 · Duration: 3:28:12
URL: https://www.youtube.com/watch?v=N5DAW8mkJ6Y

KEYPOINTS

1. Staying well rests on the same pillars as general health
Seheult, a pulmonary and critical care physician, organizes prevention around NEWSTART, a mnemonic coined by Dr. Neil Nedley: nutrition (as natural and unprocessed as possible), exercise, water, sunlight, temperance (avoiding toxins), air, rest and trust. Exercise follows a J-curve: going from none to mild or moderate activity lowers inflammation, while elite-level loads can leave athletes more vulnerable to illness.

2. Infrared light penetrates deep and supports mitochondria
Seheult cites a 2019 paper in Melatonin Research by Scott Zimmerman and Russel Reiter showing long-wavelength infrared photons can scatter up to about 8 cm into the body, through clothing and skin. Mitochondria appear to make melatonin on site, in far higher concentrations than the pineal gland, and use it locally as a powerful antioxidant that mops up reactive oxygen species and upregulates glutathione, rather than as a sleep signal. Red and near-infrared light also act on cytochrome c oxidase and nitric oxide to improve mitochondrial efficiency.

3. Mitochondrial dysfunction underlies many chronic diseases
Seheult notes ATP output is said to drop about 70% after age 40 and that diabetes, hypertension, heart disease and dementia share mitochondrial dysfunction at their root. During the COVID pandemic, his ICU patients were dying with exactly those conditions, which led him to sunlight as a low-cost way to support mitochondria. This is his mechanistic framing, built partly on observational data.

4. Green spaces multiply infrared exposure
Chlorophyll strongly reflects infrared, so a sunny day among trees and grass delivers perhaps two to four times more infrared than open pavement. Living near green space correlates with less diabetes, hypertension and mortality. In a Louisville, Kentucky project, planting over 8,000 mature trees in a four-square-mile area, with no change in income or exercise programs, was followed by lower levels of the inflammation marker hs-CRP, an effect Seheult likens to exercising three times a week.

5. Sunlight appears protective against influenza
The 2009 H1N1 pandemic peaked in summer, decoupling flu from winter, and a Harvard analysis of solar radiation concluded sunlight strongly protects against influenza. A 2021 European COVID analysis found autumn surge dates were not predicted by temperature or humidity but tracked latitude, starting in Finland and ending in Greece. US flu deaths peak 1 to 3 weeks after the shortest day; Australia's peak in late June or early July; Singapore's are not seasonal.

6. Fever is a feature: heat boosts interferon
Interferon is the innate immune system's broad antiviral weapon, effective regardless of variant, which is why viruses such as SARS-CoV-2 carry genes to suppress it. In a lab study, lymphocytes exposed to bacterial LPS secreted 10 times more interferon once temperature reached 39°C (about 102.2°F). Seheult argues against reflexively suppressing fever, noting heavy aspirin use in 1918 army hospitals coincided with high case fatality.

7. Cold after heat mobilizes white blood cells
Brief cold causes vasoconstriction, which knocks white blood cells off vessel walls into circulation, a process called demargination, and also locks in core heat. The Battle Creek sanitarium protocol was about 20 minutes of heat followed by less than a minute of cold with rubbing of the chest.

8. NAC reduced flu symptoms, not infections
NAC replenishes glutathione and breaks disulfide bonds, thinning mucus and possibly limiting von Willebrand factor polymers implicated in the white clots seen in COVID autopsies. Seheult cites a multicenter, double-blind, placebo-controlled winter trial of 600 mg twice daily: infection rates did not fall, but symptoms did, especially runny nose and sore throat. He takes that dose during flu season but no longer than about three months; in vitro cancer-model concerns should be taken with a grain of salt, in his view.

9. Flu shots reduce severity more than infection
Strains are chosen by watching the opposite hemisphere six months earlier. Seheult gets one yearly because ICU work exposes him heavily, and recommends it for the immunocompromised, the metabolically unhealthy and the highly exposed. He gave his children the shot from their teens. Huberman has never had one; Seheult frames it as weighing risks and benefits using a Swiss cheese model of layered protections.

EXAMPLES

1. Glenn Jeffery's red-light trials
At University College London, Jeffery gave older adults 3 minutes of 670 nm red light in the morning, which improved color sensitivity for days; it only worked in the morning. In a blinded trial of 30 people given 75 g of glucose, red light on their backs lowered glucose peaks and raised exhaled CO2, consistent with more active mitochondria.

2. A Brazilian 940 nm COVID trial
A randomized, double-blind, placebo-controlled study found 15 minutes a day for 7 days of very low-power 940 nm light, about 2.9 mW/cm², got hospitalized COVID patients out sooner. Jeffery told Seheult benefits plateau after about 15 to 20 minutes across species.

3. 1918 sanitariums versus army hospitals

Wells Ruble of the New England Sanitarium compared Adventist sanitariums using hydrotherapy and sunlight with army hospitals and reported about one-sixth as many flu patients progressing to pneumonia; once pneumonia set in, mortality was about 50% in both. Julius Wagner-Jauregg won the 1927 Nobel Prize for curing neurosyphilis by inducing malarial fevers.

4. Forest bathing in hinoki cypress forests

Japanese studies took Tokyo executives on three-day forest walks; tree-emitted phytoncides shifted innate immune markers for about seven days. Diffusing hinoki oil in a hotel room produced similar immune effects, though urinary cortisol fell only in the forest.

5. Eucalyptus oil and phagocytosis

An in vitro oncology study found a small amount of eucalyptus oil dramatically increased immune cells' engulfing of beads. Seheult warns it must never be taken internally, as deaths have been reported; he dabs a little on his upper lip to inhale.

OTHER RELEVANT

1. Get about 15 to 20 minutes of outdoor light daily, especially in winter

From November to mid-January many people go weeks without 15 minutes of daylight, and Americans spend about 93% of time indoors. Take lunch outside if that is your only chance. If you are fair-skinned, a single clothing layer and a broad-brimmed hat block much UV while infrared still penetrates. Red-light lamps should match sunlight's intensity; more is not better.

2. Keep nights dark

Use blackout curtains, foil for day-sleeping shift workers, or an eye mask. Huberman cites Charles Czeisler's lab: about 15 seconds of artificial light at night significantly suppresses melatonin. For bathroom trips, point your phone flashlight at the floor rather than looking at a screen.

3. Use heat, then brief cold, when you feel sick

Hot baths, sauna, hot showers or hot towels raise core temperature; finish with less than a minute of cold. Seheult would keep the fever over other symptoms.

4. Zinc, masks and handwashing

Seheult cites recommendations of about 40 mg of elemental zinc, read the label for elemental zinc, and monitoring copper, since excess zinc can deplete it. Surgical masks mainly stop outgoing droplets; N95s filter inhaled air but add breathing work for people with COPD. Handwashing data are mixed, but we constantly touch eyes, nose and mouth.

5. Recover lost smell with training

COVID damages ACE2-rich support cells around olfactory neurons. A randomized crossover trial found sniffing a variety of scents such as orange, lemon and chocolate on smell-training sticks helped restore smell.

6. In hospital, ask informed questions

Seheult says the best way to get attentive care is for a family member to ask intelligent questions about the condition, never to yell at staff.

How to Make Better Decisions | Dr. Michael Platt

Guest: Dr. Michael Platt
Date: 2025-02-17 · Duration: 3:48:52
URL: https://www.youtube.com/watch?v=bAWUYuygS_U

KEYPOINTS

1. Human decision-making runs on primate hardware
Platt, a neuroscientist at the University of Pennsylvania, has spent his career comparing humans with rhesus macaques. He argues that the circuits for attention, valuation and social decisions look 'almost exactly the same' in both species. What we notice depends on what we are looking for and on what grabs our ancestral priorities: brightness, motion, novelty and especially other faces.

2. Attention is foraging
Platt argues that attention follows the same rules animals use to search for food. Eric Charnov's 1976 marginal value theorem says to leave a 'patch' when what you're getting from it drops below the average for the environment. About 50 years of observation suggest every animal behaves this way. Computer scientists later found that people leave websites the moment their information intake falls below the average across sites.

3. A rich environment makes you a flitting forager
With one apple tree for 10 miles, you strip it bare. In an orchard, you grab the easy apples and move on. Slow dial-up internet made people read whole pages. Twelve open tabs, several screens and a phone make us flick between sources in seconds, which is exactly what this circuitry is designed to do. Platt's fix is to make the environment poorer: remove or degrade the alternatives.

4. An urgency signal builds as rewards fall off
In Platt's foraging studies, activity in the anterior cingulate cortex rises as returns from the current option deplete, signaling that it's time to switch. He suspects this is the itch to flip your phone over. Much of it runs below awareness, so we multitask even when we think we aren't.

5. Where you sit on the focus–explore continuum varies
People range from hyperfocused, near the obsessive end, to over-exploring. Most of us are in the middle, and we tend to drift toward focus with age. Creativity tracks the exploratory end. Platt thinks practice can move your 'dial' a couple of notches, such as from 3 to 5, but not from 3 to 10, which matters when matching people to careers.

6. Oxytocin calms monkeys and flattens hierarchy
Human nasal-spray studies are inconsistent, partly because people dose themselves unreliably. So Platt's lab gave macaques oxytocin through a nebulizer. The monkeys became less vigilant to threats. Dominant males became 'super chill' and subordinates bolder, with more eye contact and more giving of juice to other monkeys. Oxytocin and vasopressin seem to increase behavioral synchrony. Platt cites work suggesting that oxytocin contributes little to MDMA's empathogenic effects.

7. Isolation is a serious health risk
Platt notes that research ranks social isolation as worse for health than smoking 15 cigarettes a day, with risk scaling roughly with how few social contacts you have per week. Huberman compares it to chimpanzees left ungroomed after being ostracized. Platt links this to rising despair, mental illness and physical disease.

8. Decide in advance whether you need to be fast or accurate
The brain accumulates noisy evidence over time, so going faster means more errors. Sleep deprivation and fatigue push you toward speed. Platt's mantra: before an important decision, decide whether accuracy or speed matters, and if it's accuracy, slow down and gather more information. High arousal also makes people mistake noise for signal.

9. Loss aversion follows where you look
Using eye tracking and modeling, Platt's group found that most people look at what they might lose in a 50/50 gamble. The longer they look at it, the more loss-averse they become, and this is stronger in anxious or depressed people. More broadly, what you attend to gets 'turned up' in the brain, so attending to small positive surprises may amplify them.

10. Testosterone tilts decisions toward risk
Platt agrees that studies of traders show higher testosterone, natural or taken, tracks more aggressive, impulsive and risk-taking decisions. He worries about this in markets as testosterone therapy spreads. Huberman adds that exogenous testosterone mainly buffers the dips that come from poor sleep and stress.

EXAMPLES

1. Monkey 'pay-per-view'
Macaques chose between juice rewards that sometimes came with a picture. Male monkeys gave up juice to see female hindquarters and dominant males' faces, and had to be paid extra to look at subordinate males. Females gave up juice for signals of testosterone-rich males. In the human version, men paid about half to three-quarters of a cent per trial, waited longer and worked harder to see photos of women rated in the top third for attractiveness. Women mostly ignored the pictures and kept the money.

2. Penn wrestlers and fatigue
Wrestlers fell apart in the third period. After rounds of brutal two-minute CrossFit circuits, they slid steadily toward speed over accuracy on a go/no-go task. Because they were already about as fit as possible, the fix was to hand off decisions: in the third period they look to the coach and execute.

3. Advertising to monkeys

Logos such as Doritos shown next to images of high-status or sexy monkeys later won out over logos paired with low-status monkeys, even though every choice earned the same banana pellet. 'There's a little monkey in all of us.'

4. Apple vs. Samsung brains

Users rated their brand loyalty equally. In the scanner, Apple users showed reward and pain responses to good and bad news about Apple, as if it were family. Samsung users showed little for Samsung, but took pleasure in Apple's bad news. EEG showed Apple users' brains synchronizing during ads, and social-brain regions were physically larger in Apple users. Platt cites roughly 91% of teens choosing Apple.

5. Money and happiness

Platt notes that Matt Killingsworth's work at Penn/Wharton challenges the old '$75,000 plateau', finding that happiness keeps rising with very high income. He adds that people can still choose contentment, and he connects this to attention.

OTHER RELEVANT

1. Get the phone out of the room

Huberman cites a finding that working memory is significantly better only when the phone is in a different room. Face down or in a bag nearby isn't enough. Grayscale mode also helps by making the phone a poorer patch to forage in.

2. Warm up your attention

Studies Platt describes show that a prior foraging task carries over. Searching dispersed targets makes people more exploratory on a later word game, while narrow focusing makes them more focused. Huberman links this to practices in China where students fixate on a point before cognitive work. Ideas from both: a few minutes of narrow visual focus, or eyes-closed 'thinking in complete sentences', before deep work.

3. Use structured deep questions to connect across divides

Question sets like the Arons' 'Fast Friends' (late 1990s) move strangers from small talk to depth quickly. Emily Falk's work showed that strangers' brain activity converges as they answer, which predicts liking and closeness. Making time for this with people unlike you may help bridge tribal divides.

How to Build Strength, Endurance & Flexibility at Any Age | Pavel Tsatsouline

Guest: Pavel Tsatsouline
Date: 2025-02-10 · Duration: 4:15:13
URL: https://www.youtube.com/watch?v=Z3OpxT65fKw

KEYPOINTS

1. Pick a few strength lifts and stick with them
Pavel recommends a short list of lifts that build strength beyond the lift itself. His examples are a posterior-chain lift such as the narrow-stance sumo deadlift (after learning to hip hinge), a Zercher squat, a press such as the bench press, plus pull-ups or dips. Varying grip or adding pauses is fine, but there's no need for constant novelty. He cites Canadian research from the 1980s showing leg extensions don't carry over to the squat because the coordination is so different.

2. The Zercher squat is a squat most people can do
The bar rests in the crooks of the elbows, so people with bad shoulders, wrists or elbows can still squat. It forces the midsection to stabilize by reflex, which teaches you what bracing feels like. Double bodyweight is a strong goal for an athlete.

3. Strength is a skill: 'greasing the groove'
Repeating a movement strengthens the neural pathway from brain to muscle, which he likens to Hebbian learning. Over time the same weight takes less effort. In the 1950s Soviet lifters did mostly singles, doubles and triples, so hypertrophy couldn't explain their gains. Intensity, he insists, means how heavy the weight is, not how hard you strain.

4. The core rules of greasing the groove
Use 75–85% of your one-rep max ('heavy enough to respect, light enough not to fear'). Do about half the reps you could, for example 3–4 reps with a weight you could lift 8 times. Rest at least 10 minutes between sets, train 2–3 days in a row and then take a day off. The long rests may help with memory consolidation, much like spacing out study sessions.

5. Mixing in short strength efforts can boost other work
Soviet coaches described a 'strength after-effect': a few non-exhausting, familiar sets, such as 3×3 at 80%, made athletes fresher during track practice and could be repeated when they began to flag. Pavel suggests dropping for a few one-arm push-ups every 10 minutes during a class, or keeping a kettlebell under your desk.

6. Many different programs can get you strong
Pavel contrasts the Soviet weightlifting system (frequent, moderate, sub-maximal) with 1980s American powerlifting (infrequent and heavy, close to Mike Mentzer's ideas). Both work because they rely on different mechanisms. He warns that maxing out every week produces quick gains that stall after about six weeks, or about three for experienced lifters.

7. Squeezing your grip makes you stronger in other lifts
Crushing the bar sends tension into nearby muscles, so you can get extra reps even in curls. Grip strength also correlates with longevity, though he stresses correlation isn't causation. To train crushing grip, climb a rope weekly, do pull-ups a few times a week, do heavy kettlebell snatches or use grippers. Hanging and farmer's carries do less for grip than people assume, and Stuart McGill warns that carrying two heavy objects loads the spine hard.

8. Concentric-only and assisted eccentric work each have a place
Lifting the weight and dropping it, with no lowering phase, builds strength with little muscle growth or soreness. Barry Ross used concentric-only deadlifts with a 17-year-old Allyson Felix. For eccentrics, after your heavy sets load 5–10 lb over your max, lower it at your normal max-attempt speed, pause on the chest while staying tight, and let skilled spotters take it, for 2–3 reps.

9. Train endurance without flooding your muscles with acid
Short efforts with short rests keep work running on phosphate and aerobic energy instead of acid-producing glycolysis. Swedish research from the 1950s–60s found that 10 seconds on and 20 seconds off lets you work very hard without much acid buildup. Seasoned manual workers such as loggers naturally work in brief bursts with short pauses.

10. Gain flexibility by easing in, not forcing
Much of a limited range of motion is protective inhibition, not tissue length. Go to the edge of discomfort, stay there until your body accepts the new range, then add contract-relax isometrics. 'There's never time for ripping yourself in half.' Loaded long-range work, such as overhead kettlebell presses and careful deep squats, can also lengthen muscle.

11. Core training comes down to tension and attention
Learn what tight abs feel like through Zercher or double-kettlebell front squats. Contract the pelvic floor, direct attention to specific parts of the abdomen, keep reps slow and low, and progress patiently. Huberman went from failing hanging pikes to doing five sets of five.

EXAMPLES

1. Anti-glycolytic training for MMA fighters
In the study Pavel describes, one group did 3 reps at 70% of their one-rep max (a weight fighters could lift 20+ times), moving through three exercises with one minute of rest between rounds. That group 'blew the traditional group out of the water', did more consecutive reps and performed better in competition. The test that best predicted fight performance (r"H0.88) was how fast heart rate recovered after an all-out set of deadlifts at 70%.

2. Pavel's father, a record holder in his 70s
His father first entered a powerlifting meet at 71. By 75 he held several American records and deadlifted in the low 400s without a belt at 198 lb, and Stuart McGill said his back muscles looked like a 40-year-old's. At 87 he still does 50+ pull-ups and 100+ bodyweight squats twice a week. Pavel's mother, a former ballerina, climbs a high-rise one floor at a time, walking

the hallway between flights.

3. A father-in-law's pull-ups at age 64

Roger, a retired firefighter and Marine with a 10-rep max, did sets of five whenever he passed the bar and added reps once they felt easy. Working up to sets of nine, he tested and did 20 pull-ups, passing the Marine pull-up test he couldn't pass as a young Marine.

4. German interval training for the heart

Run 60–90 seconds until heart rate peaks around 85–90% of max, then jog (never stop) until it drops to about 60–70%. Pavel says the blood still returning to a slowing heart stretches its walls.

5. Two other interval formats

Glycolytic power repeats, from research on Wingate-style sprints, are 30 seconds of hard work followed by about 5 minutes of rest, repeated several times. They train the heart and mitochondria and may even build muscle. For hypertrophy, an Italian method shared by Fabio Zonin uses sets of 5 at 80% with 30-second rests until you can't complete one, then repeats about 10 minutes later.

OTHER RELEVANT

1. A simple weekly program

Huberman suggests a Zercher squat, kettlebell swings or another posterior-chain lift, pull-ups and dips, and Pavel agrees. Dips require being able to do a full 'skin the cat' first. Several sets of five on the bench press once a week keeps progress going.

2. Add anti-glycolytic sessions for real-world endurance

Do 3 reps at about 70% of your max across 2–3 lifts, rest a minute, and repeat for up to 15 rounds, two to four times a week as a light day. He programmed Zerchers, towel pull-ups and close-grip bench presses for jiu-jitsu competitors.

3. Don't train to failure

Medium reps with medium effort and high total volume builds both strength and muscle safely, especially for older adults. Stay in the zone between boredom and anxiety that Csikszentmihalyi describes as flow.

4. Gaze and neck position

Most lifters do best with a neutral neck and eyes following the head, as 1,000-lb deadlifter Andy Bolton does. McGill notes that lifting your gaze can help some long-necked lifters, but it may overarch people who already have a big lumbar curve.

Using Your Mind to Control Your Physical Health & Longevity | Dr. Ellen Langer

Guest: Dr. Ellen Langer
Date: 2025-03-03 · Duration: 3:22:20
URL: https://www.youtube.com/watch?v=QYAgf_lfio4

KEYPOINTS

1. Mindfulness, in Langer's sense, means actively noticing new things, not meditating
The Harvard psychologist calls meditation a practice that leads to post-meditative mindfulness. Her mindfulness is a way of being. Bottom-up, you notice three new things about the person you live with or your walk outside. Top-down, you accept that everything is always changing, looks different from different perspectives, and that uncertainty is the rule. Her example: 1+1 isn't always 2, since one wad of gum plus another is one.

2. Mind and body are one system, not two things to be connected
Langer argues that 'mind-body connection' language leaves you having to explain the connector. If they're a unity, wherever you put the mind, the body follows. Most of her health research tests this premise.

3. Small choices extended life in nursing homes
In 1970s work prompted by a relative's decline, residents were encouraged to make choices: where to receive visitors, whether to see a movie Tuesday or Thursday, and caring for their own plant. A comparison group got the same visits, movie and plant, but staff decided everything and nurses cared for the plant. At 18 months, the choice group had lived longer. Langer says this began her health research.

4. Beliefs about exercise changed physical outcomes
With then-student Alia Crum, Langer studied hotel room attendants who said they barely exercised because they saw exercise as something done after work. Half were taught that their work (bed-making, cleaning windows) was exercise. Without changes in diet or effort, that group lost weight and improved waist-to-hip ratio, BMI and blood pressure. Langer frames the untaught group as a nocebo: doing the exercise without realizing it seemed to blunt its benefit.

5. Placebos are underrated medicine
Langer calls placebos perhaps our strongest medicine and notes they got a bad reputation because drugs must beat them in trials. Her examples: people told ipecac would stop vomiting stopped vomiting, and people rubbed with a leaf react as if it were poison ivy depending on what they believe it is. If a placebo cured you, she points out, you cured yourself.

6. Perceived sleep shapes next-day functioning
In a sleep-lab study, a clock told people they had slept two hours more, two hours less or the actual amount. Cognitive and biological measures tracked perceived rather than actual sleep. Huberman adds that positive anticipation of the next day may reduce sleep need, and warns against 'sleep anxiety' from tracker scores. Langer's personal claim that relaxing with dim lights for two to three hours before bed lets her sleep two to three hours less is her own experience, not a tested protocol.

7. Labels hide ambiguity: the borderline effect
An 89 and a 90 are essentially the same score, but one is a B and the other an A. Someone scoring 69 versus 70 on an IQ test may be labeled cognitively deficient, get less training and come to believe it, so a trivial difference becomes real. Langer says her data show the same thing with medical diagnoses near a cutoff.

8. Symptoms vary, and noticing why helps
Nothing stays at maximum. Langer's teams call patients periodically to ask whether a symptom is better or worse than last time and why. This reduces helplessness, reveals that things are sometimes better, engages mindful attention, which she says is itself good for health, and makes solutions more likely. She reports positive results in multiple sclerosis, chronic pain, Parkinson's and stroke, with no side effects, alongside rather than instead of medical care.

9. Expectations about decline may become self-fulfilling
Langer thinks spontaneous cancer remissions are more common than medicine recognizes because they're rarely studied. Believing a disease is a death sentence can change behavior in ways that make it one. She says hope needs only that something be possible, not frequent. These are her views rather than established findings.

EXAMPLES

1. The counterclockwise study
Men around 80, some looking as if they could barely make it down the hall, lived for a time in a retreat retrofitted to 20 years earlier and spoke about past events as if they were unfolding. Langer reports improvements in vision, hearing, memory and strength, and that they looked noticeably younger.

2. Wounds healed by clock time
With graduate student Peter Aungle, Langer gave participants a minor wound and sat them in front of a clock running twice as fast, half as fast or at real time. Healing tracked the clock time they saw, not actual elapsed time. Her implication: when a doctor gives a fixed healing estimate, patients may organize around it. 'We don't know; some people heal faster' may be better.

3. Reversing the eye chart
The standard Snellen chart's shrinking letters create an expectation of failing. When Langer's team made letters grow larger down the chart, or started a third of the way down, people could read lines they previously couldn't. She also notes vision likely varies by time of day, so a single test freezes something that fluctuates.

4. Air Florida and the mindful checklist
Langer recalls the crash in which a crew flying between warm climates ran 'anti-ice off' by rote despite unusual snow in

Washington, DC. She told Atul Gawande checklists should be mindful, with questions that can only be answered by actually looking ('what position is the patient in?') rather than yes/no.

5. 'Not afraid of dying, but living is such fun'

Langer ended her Counterclockwise book with this line from a friend in her nineties, reflecting her observation that the very old people she knows rarely fear death.

OTHER RELEVANT

1. Ask: tragedy or inconvenience?

Langer says if you remember one thing, remember this. A failed test, a dented car or a missed bus is almost never a tragedy. Take a breath and recognize that most of what makes us crazed is unnecessary, and that we're usually our own worst enemy.

2. Practice the 'three new things' drill

Each day, notice three new things about a familiar person, place or task. Each time, you discover you knew it less well than you thought, which Langer says pulls you out of mindless autopilot.

3. Track your symptoms' ups and downs

When something is chronic (pain, stress, a condition), periodically ask whether it's better or worse than before and why. Nobody is stressed all the time, and the pattern may point to a fix.

4. Be playful for its own sake

Langer warns that doing everything 'so that eventually…' is the problem. Playfulness and enjoyment likely bring happiness and health as side effects, but the reason to do them is the experience itself.

Charting the Architecture of the Universe & Human Life | Dr. Brian Keating

Guest: Dr. Brian Keating
Date: 2025-01-20 · Duration: 3:07:37
URL: https://www.youtube.com/watch?v=3-ukCGQJk2c

KEYPOINTS

1. Astronomy is the most visceral science
Keating, a cosmologist at UC San Diego, notes that 'cosmos' comes from the Greek for beauty or appearance. We're born with two refracting telescopes in our skulls, the eyes, and Huberman adds that the retinas are brain tissue pushed out of the cranial vault during the first trimester. Cosmology appeals to our pull toward beginnings: the origin of the universe is the one event nothing could witness.

2. Astrology fails the test of being falsifiable
Your sign is set by the constellation behind the sun on your birthday, but the zodiac, dating back 5,000–6,000 years to the Babylonians, ignores Ophiuchus, which the sun passes through for about 17 days in late November and early December. Keating once told an astrologer he was a September-born Gemini and got the same reading anyway. In Karl Popper's terms astrology is unfalsifiable: it can accommodate any outcome.

3. The sky was humanity's first clock
Huberman explains that most animals track day length through melatonin from the pineal gland. Some birds and reptiles have thin skulls or pits that let light reach it directly, but in humans the gland sits deep in the brain and gets light information only through the eyes, so 'ear lights' won't reach it. Knowing whether days were lengthening mattered for a baby's survival, which Huberman suggests is one reason people charted the stars.

4. Our edge is modeling the future, which also makes us find false patterns
Keating notes that 'sapiens' means wisdom, not knowledge. Our strength is the prefrontal cortex's ability to run thought experiments and simulate outcomes. That same habit makes us confuse correlation with causation and fall for confirmation bias, which scientists must guard against most of all.

5. Galileo is Keating's scientific hero
Telescopes grew out of Dutch eyeglass-making, but their inventor only used them as spyglasses. In 1609 Galileo turned one, magnifying about 3–10 times, to the sky. He found mountains on the 'perfect' moon, saw Jupiter's moons, proposed the relativity of motion, invented the tripod, and paired an instrument with a testable hypothesis. Keating adds that Galileo wrongly argued the tides proved Earth moves.

6. Refraction is light slowing in a medium
Light travels about 300,000 km per second in a vacuum and slows in glass or water. Like a row of marching soldiers hitting water at an angle, the beam bends. That's why a coin in a fountain isn't where it looks, and why shaped lenses magnify.

7. BICEP was Keating's lost Nobel
With a $1 million gift from Caltech president David Baltimore's fund (about $10 million in total), Keating designed a microwave-transparent refracting telescope at the South Pole to look for gravitational-wave patterns in the cosmic microwave background, evidence of inflation, the theory of Alan Guth and Andrei Linde. The team announced a discovery at Harvard on St. Patrick's Day 2014 before peer review, for fear of being scooped by a billion-dollar satellite, and it was disproven within months. His book Losing the Nobel Prize tells the story.

8. The South Pole is the best place on Earth to measure faint heat
The target is a few billionths of a degree, so the 5,700-kelvin sun must be below the horizon, which it is for six months at a time. At 9,000 feet it's too cold for much humidity: all the water above it would condense to about a third of a millimeter, compared with roughly 25 mm over Los Angeles. That matters because water absorbs microwaves. Space-based telescopes cost about 1,000 to a million times more.

9. The moon illusion
The moon is always about half a degree wide, the same as the sun, which is why total solar eclipses are possible. It looks huge at the horizon only because buildings and trees give your brain something to compare it to. A pinky at arm's length (about half a degree) covers it either way, and a thumb covers about one degree. Keating adds that the moon drifts roughly a centimeter farther away each year, so total eclipses will eventually end.

EXAMPLES

1. A 12-year-old's first observation
In 1984 Keating mistook a bright 'star' beside the setting moon for a piece broken off it, waited for the Sunday New York Times sky chart, and learned it was Jupiter. A $75 telescope, bought with deli wages and help from his mother, followed.

2. A Nobel chase fueled by an absent father
Keating's father, a mathematician who was a full professor at Cornell at 26, left when Keating was seven. Keating set out to win the Nobel his father never did, but realized the motivation no longer served him after they reconciled. 'Baggage has handles', as his brother says.

3. Scott versus Amundsen
Robert Falcon Scott reached the South Pole about three weeks after Roald Amundsen, found the Norwegian flag, and died on the return journey, weighed down by scientific samples. Amundsen's team used sled dogs for propulsion and, later, food.

4. Visual acuity in numbers
Huberman explains that 20/20 vision resolves about 60 cycles per degree and raptors about 120. That's why a hawk on a

lamppost can see grass rustle below.

OTHER RELEVANT

1. Get out and see a dark sky

Go 20–40 or more miles from a city, or to a dark-sky community such as Julian or Borrego Springs, California, where upward-shining lights are banned. Use your naked eye for meteor showers, such as the Yosemite high country in August. On fall nights you can see the Andromeda galaxy, six times wider than the full moon, which Edwin Hubble showed in 1923 lies far outside the Milky Way.

2. A cheap telescope shows most of the highlights

About $50 will show lunar craters and mountains, Saturn's rings and Jupiter's moons. Keating says you'll see about 90% of what fascinates a beginner.

3. Keating is skeptical about life on other planets

He says there's zero evidence of life beyond Earth. Rock has been exchanged between planets: Mars meteorites such as ALH84001 (Allan Hills), whose announced signs of microbial life were never confirmed, have landed on Earth, and Earth rock carrying life has surely reached Mars. He argues Mars's apparent lifelessness is therefore a meaningful data point, while acknowledging he's an outlier on this question.

How to Use Exercise to Improve Your Brain’s Health, Longevity & Performance

Date: 2025-01-06 · Duration: 1:49:32
URL: https://www.youtube.com/watch?v=J2oqi41dCNc

KEYPOINTS

1. Most of exercise's immediate brain benefit comes from arousal
Huberman's central argument is that the short-term cognitive boost from exercise mostly comes from autonomic arousal: higher epinephrine, norepinephrine and cortisol. Growth factors like BDNF, IGF-1 and irisin matter more over the long term. Because the effect works through arousal, timing exercise relative to learning matters, and so does not overdoing it.

2. Arousal improves memory both before and after you learn something
Work from Larry Cahill's group and others shows that raising arousal after exposure to information, using the cold pressor test (arm in ice water for 1–3 minutes) or adrenaline injections, improves memory for the information and its details. Exercise produces similar arousal. Studies show benefits whether it's done before, during or after learning, so you can fit it to your schedule as long as the two are reasonably close in time.

3. One HIIT session sharpens executive function, but two can dull it
A high-intensity session before, or even during, cognitive-flexibility tasks like the Stroop test improves performance, likely through arousal plus increased cerebral blood flow. But after two hard sessions in a day (for example two rounds of 4×4 intervals), cognitive performance drops, and this tracks with reduced cerebral blood flow. Too much arousal leads to a trough that makes learning harder.

4. The brain can drive the adrenals directly through movement circuits
Peter Strick's lab at the University of Pittsburgh traced three networks of brain areas that connect to the adrenal medulla: cognitive, affective and, most strongly, the motor network. Motor regions controlling the trunk and core are especially well connected. That's one reason Huberman favors compound movements like squats, deadlifts, rows and pull-ups for energy and focus. The slower hypothalamus–pituitary pathway still operates alongside this.

5. Loaded bones release osteocalcin, which supports the hippocampus
Studies, first in mice at Columbia and later in humans, show that bones under mechanical stress release osteocalcin. It crosses the blood–brain barrier and promotes neuron growth and connections in the hippocampus, possibly (Huberman stresses 'perhaps') including new neurons in the dentate gyrus. Many of exercise's BDNF effects appear to depend on osteocalcin. No one has systematically worked out which exercises release the most, so impact and jumping are a reasonable inference rather than a proven protocol.

6. Lactate is brain fuel and helps protect the blood–brain barrier
During intense exercise, neurons prefer lactate as fuel, which spares glucose for cognitive work afterward. Lactate also acts on the hypothalamus to suppress appetite after hard efforts. It also triggers VEGF, which strengthens the blood–brain barrier. Huberman points out that this barrier breaks down with age and especially in Alzheimer's disease.

7. Exercising after one bad night of sleep is fine, but don't make it a habit
After a single night with about two hours less sleep than usual, exercise can offset some of the cognitive effects. Keep the intensity moderate to avoid suppressing the immune system, and be careful with complex movements, since sleep deprivation is strongly linked to injury, pain and slower recovery. Using exercise regularly to make up for lost sleep is a mistake.

8. Doing hard things you don't want to do may keep the brain young
The anterior mid-cingulate cortex lights up when we push through physical or mental challenges. Stimulating it, as in work by Josef Parvizi at Stanford, makes patients feel an impending challenge they're ready to meet. In 'SuperAgers,' people whose cognition stays sharp into their 80s and 90s, this area holds its volume or even grows. Huberman's inference is to do something safe but unwanted at least once a week.

EXAMPLES

1. Six-second sprints
In one study, six all-out 6-second sprints on a stationary bike, each followed by one minute of rest, significantly improved cognitive performance in healthy young adults. Huberman says he'd bet 'six of my 10 fingers' that the effect comes from arousal, since growth factors can't act that fast. The same logic helps explain why exercise snacks like 20 air squats or jumping jacks can help.

2. Single-leg extensions in older adults
Many brain studies use a seated single-leg extension because untrained people over 65 can do it safely with little instruction. The papers Huberman cites include 'A single bout of resistance exercise can enhance episodic memory performance' and 'Executive function after exhaustive exercise.'

3. Huberman's short HIIT session
When he's short on time, Huberman warms up on an Assault/AirDyne bike for 1–2 minutes, then alternates one minute all-out with 30 seconds of rest for about eight rounds. He notes that Andy Galpin sees the 4×4, 3×3 and 6×6 variants as roughly interchangeable, and that 6×6 is too much for many people.

4. Cold exposure as his 'unwanted' challenge
Huberman is heat-adapted and 'close to hates' the cold, so getting into a cold plunge or cold shower for 1–3 minutes is his weekly anterior mid-cingulate workout. He's more interested in that resistance than in the cold itself, and he mentions experimenting with rope flow as a new skill.

OTHER RELEVANT

1. Build four elements into your week

Huberman's list: (1) one long slow distance session of 45–75 minutes in zone 2, using any activity you can do without injury, such as jogging, rowing, cycling or rucking; (2) at least one HIIT session; (3) time under tension, meaning an explosive lift followed by a lowering phase at least twice as slow, without setting the weight down; (4) explosive jumps with controlled landings.

2. Add a fifth: something hard you'd rather skip

Choose a safe physical or mental challenge you dislike and do it weekly. Huberman suggests the reluctance itself is the stimulus.

3. Bring in jumping and landings gradually

Try jump rope with high knees or double-unders, or box jumps starting low, on mats, grass or dirt. New eccentric work causes a lot of soreness and can lead to injury, so build up slowly. Peter Attia's point about falls, fractures and mortality makes controlled landings useful at any age.

4. Use the Foundational Fitness template if you want a structure

Huberman's free plan has about three cardio sessions (roughly 12–60 minutes) and three resistance sessions (45–75 minutes) a week, none longer than about an hour. Adapt it if you already have a program that works.

How to Best Guide Your Life Decisions & Path | Dr. Jordan Peterson

Guest: Dr. Jordan Peterson
Date: 2024-12-30 · Duration: 3:51:10
URL: https://www.youtube.com/watch?v=K0hkhbGYaGQ

KEYPOINTS

1. We hold several 'personalities' driven by primitive circuits
Huberman frames the conversation around the hypothalamus, a structure about the size of two marbles that is 'mostly switches' for drives like aggression, sexuality and hunger. He describes the prefrontal cortex's main job as context-dependent strategy setting. Peterson argues that each activated drive acts like a sub-personality with its own perceptions, emotions and rationalizations. In a mouse whose attack circuit is switched on, even a dropped glove becomes a 'defeatable enemy.'

2. Maturity is integration, not inhibition
Peterson rejects a model where the cortex merely suppresses impulses. His willful young son wasn't taught to stop being assertive or aggressive but to subordinate that aggression to a higher goal, and he became a very good athlete. A sophisticated team athlete isn't 'not aggressive,' Peterson says. Their aggression is put in its proper place within a voluntary structure that spans longer stretches of time.

3. Early aggression must be socialized by about age four
Peterson cites research on groups of children from age two to 15. Two-year-olds are the most aggressive, and roughly 5% of them, all boys and often physically bigger, kick, steal, hit and bite. Almost all are socialized by four. The remainder, lacking friends, become isolated and are at risk of delinquency, early-onset criminality and reoffending. 'Two-year-old impulsiveness has its place,' but it 'better be fixed by four' because children need friends.

4. Religious transformation has long been seen as a reliable alcoholism treatment
Peterson, who studied alcoholism for his dissertation and first 20 papers, says alcohol researchers, including non-religious ones, have recognized for 60+ years that religious transformation is among the most reliable treatments. He attributes this to incentive restructuring: addiction is a 'false incentive pattern' that mimics progress toward an important goal, so recovery requires substituting a genuine higher aim. He notes that rats in natural environments don't self-administer cocaine to death; isolated rats in cages do.

5. Pornography and processed food act as supernormal stimuli
Peterson compares pornography to the stickleback fish experiments (as he recalls them, male sticklebacks attack red-bellied rivals, and a bigger, brighter dot than any in nature becomes irresistible). Dopamine reinforces whatever circuits fired just before a reward, so the porn-oriented 'personality' can come to dominate. Huberman adds that whole foods let the hypothalamus learn links between taste, volume, macronutrients and satiety, but multi-ingredient processed foods hit many gut and brain sensors at once so that link can't form.

6. Effortless dopamine is the danger
Huberman restates his view that any big dopamine inflection not preceded by substantial effort, such as drugs or pornography, is 'very dangerous.' Peterson connects this to sin, noting that in many languages the word means 'missing the target.' Power, in this framing, is the ability to act effectively at a distance, and aim is everything.

7. Seek the ultimate victory over the local one
In an argument with a partner, the hypothalamic urge is to win. Peterson advises pausing to imagine how the conflict could resolve in the best possible way, one that deepens the relationship over time without becoming a pushover or sweeping the issue under the rug. He cites the parable of the pearl of great price. A local win that forfeits the ultimate game is 'not a victory, it's a defeat.'

8. Responsibility and adventure are the same thing
Using the story of Abraham, who leaves comfort to follow a call and is promised he'll be a blessing to himself and others and 'the father of nations,' Peterson argues that adventure is the highest form of reward. Every upward step requires sacrificing who you were. He says conservatives tend to see responsibility as conscientious duty and miss that it is also the adventure of a lifetime.

9. Calling and conscience point the way
Things that grip your interest without your choosing are your calling, and Peterson likens them to Moses's burning bush. Things that bother you are your conscience indicating problems you're meant to address. Positive emotion signals progress toward your aim and negative emotion signals deviation. He credits Elijah as the first to identify the divine with conscience.

EXAMPLES

1. A dedicated circuit for aggressive biting
Huberman cites a paper from about two years before the episode showing a hypothalamic pathway to jaw-closing neurons used specifically for aggressive biting, separate from those for eating and drinking. Most people learn to suppress it, which is why an eight-year-old who bites signals something much more primitive than hitting.

2. Jaak Panksepp's rat play
Peterson argues Panksepp deserved a Nobel Prize for showing that rats, which he also studied for laughter, organize social hierarchies through play rather than force, revealing an implicit morality. Play emerges only when no other motivational state dominates, so Peterson calls play 'the antithesis of tyranny.' A household is well structured when children can play.

3. The Church of the Holy Sepulchre
Peterson describes the church in Jerusalem as concentric rings, with a sacrificial image at the altar at its center and the

community around it. He uses this as a picture of sacrifice at the center of social order.

4. The Hobbit is Abraham

Peterson argues that adventure stories like The Hobbit dramatize the same pattern. Aim up, live truthfully, and you get 'the redemptive adventure of your life.'

OTHER RELEVANT

1. Start by fixing what you can

Ask what bothers you about yourself, set aside what you can't yet fix, and fix something you can, even making your bed. Order spreads exponentially from a small corner, and each step reveals the next.

2. Before a fight, change your aim

Pause, picture the best possible resolution across time, and then listen even if you think the other person is wrong. That keeps the 'win-now' circuit from taking over.

3. Replace, don't just resist, compulsions

Whether the problem is porn, junk food or substances, Peterson's model says you need a compelling higher aim to restructure incentives. Willpower against a supernormal stimulus alone tends to fail.

4. Follow interest and irritation

Treat recurring fascinations as signs of calling and recurring frustrations as signs of conscience. Commit to them over long time scales rather than chasing quick rewards.

How to Achieve True Happiness Using Science-Based Protocols | Dr. Laurie Santos

Guest: Dr. Laurie Santos
Date: 2024-12-23 · Duration: 3:08:06
URL: https://www.youtube.com/watch?v=Phm-Alz1Zjo

KEYPOINTS

1. Extrinsic metrics crowd out intrinsic rewards
Santos, who teaches Yale's popular happiness course, argues that from 'toddler university' onward, young people learn to chase grades, admissions and other external markers. Noticing your own emotions takes deliberate attention. A culture full of metrics makes it harder to tell whether something actually feels good, and can make the intrinsic experience less fun.

2. Money helps happiness up to a point, then flattens
Daniel Kahneman's 2010 analysis found stress and positive emotion improved almost linearly with income at the low end but leveled off around $75,000 (pre-tax, 2010 dollars). Santos suggests that might be roughly $100,000–120,000 today. Later debate suggests the slope may keep rising, but only negligibly. She says an extra 10 minutes of exercise, 20 more minutes of sleep or a gratitude list would do more than quintupling your income.

3. We judge our lives against reference points, not objectively
Wealthy people often don't feel less stressed because their comparison group keeps moving up a roughly logarithmic ladder. The same relative judging applies to looks, fitness and success. It explains why goals that are reached rarely deliver the expected lift.

4. Social connection is the strongest behavioral lever
Time-use studies find the two best predictors of happiness are time with friends and family and simply being physically around other people. To test causation, Nick Epley and others paid people (for example, with a $10 gift card) to talk to strangers on trains. People predict it will be awkward, but both introverts and extroverts end up feeling more positive and less lonely.

5. Texting is the 'NutraSweet' of social connection
Santos's intuition, which she admits isn't yet well tested at the reward-circuit level, is that texting satisfies the motive for connection without delivering the nourishing part. With fewer 'third spaces' and the pull of screens, many people are socially malnourished while feeling busy with contact. She recommends scheduling in-person time.

6. Your phone steals attention even when it's face down
Liz Dunn's analogy: imagine a wheelbarrow at the dinner table piled with every photo, email, news story and video you could want. Your brain knows the phone holds all that. Santos cites research showing double-digit performance gains on tests when the phone is in another room rather than nearby.

7. Time famine hurts as much as unemployment
Feeling chronically starved for time is as big a hit to well-being on surveys as being unemployed. Ashley Whillans at Harvard Business School argues that much of low income's toll on happiness comes through lost time: long bus commutes and multiple jobs. What matters is the subjective sense of 'time affluence', not the number of open calendar blocks.

8. Hedonic adaptation cuts both ways
Each bite of a great salad is a bit less exciting, and the tenth 'I love you' lands less than the first. In the classic lottery winner and paraplegia study, a year later both groups' happiness was statistically no different from their baseline. Bad events fade faster than we predict, which should make us less afraid of risky attempts and failure.

9. The arrival fallacy: 'I'll be happy when…'
We imagine a promotion, marriage or $50 million as a happily-ever-after destination. Adaptation turns it into the new normal, and often just the next carrot. A 'journey mindset', looking for enjoyment in the process (such as the training runs before a 5K), is the antidote. Santos notes this is a hard frame shift in American culture.

10. Doing for others reliably lifts mood
Happy people help more, but experiments show the causal arrow also runs the other way (the 'feel good, do good' effect). In Lara Aknin and colleagues' study, people handed $20 and told to spend it on someone else reported more happiness than those told to treat themselves.

EXAMPLES

1. Bronze medalists look happier than silver medalists
Analyses of Olympic podium expressions show silver medalists compare themselves with gold and feel terrible. Bronze medalists compare themselves with not medaling at all and sometimes look happier than the gold winners. Santos turns this into the 'bronze lining': deliberately pick a comparison point that's worse, not better.

2. The cancelled Yale lecture
On the day her syllabus listed a lecture on time affluence, teaching assistants handed out flyers announcing no class: an unexpected free 90 minutes. Students went for bubble tea or hikes, and one burst into tears because it was her first free hour and a half in three months. A small, unplanned window felt enormous.

3. Time confetti
Data suggest we have more total free time than 10–15 years ago, but it comes in fragments: five minutes when a call ends early, ten when a child falls asleep. Journalist Brigid Schulte calls these fragments 'time confetti'. Because they seem trivial,

we usually waste them on the phone.

4. Hospital cleaners who call their work a calling

Amy Wrzesniewski's job-crafting research found roughly a quarter to a third of hospital janitorial staff described their jobs as a calling. Those workers were naturally weaving their signature strengths, such as humor, kindness or love of learning, into a job with little apparent flexibility.

5. Three to five delights a day for two weeks

Santos cites Sonja Lyubomirsky's work: writing down three to five things you're grateful for, or that delighted you, significantly raised life satisfaction in as little as two weeks. Santos prefers the word 'delight' and includes small things, like her morning coffee or a photo of Huberman's dog Costello.

OTHER RELEVANT

1. Schedule blank time months ahead

Block an hour in your calendar a few months out, label it, and keep it empty. When it arrives it feels like a gift. Use time confetti on purpose, for example a call to a friend or a short walk, rather than scrolling.

2. Space out your favorite things

Liz Dunn's line is that 'scarcity engineers happiness'. Having a treat less often keeps it special, so ration your best experiences instead of repeating them until they become routine.

3. Use negative visualization and obstacle planning briefly

The Stoic practice is to imagine for a moment losing your success, partner or health, then notice you still have them. Santos stresses you shouldn't ruminate. Imagining specific obstacles to a new habit also helps you plan solutions, while still believing the goal is possible, as with Roger Bannister's four-minute mile.

4. Craft your days around signature strengths

Identify your top values from the 24 character strengths described by Chris Peterson and others, then build them into existing work and leisure. Santos jokes about comparing strengths tests on a first date.

5. Ask someone for help

Being asked for help makes people feel competent and gives them the helper's happiness boost. For self-sufficient people with little money or time to give, a request for advice can be a small gift and a moment of connection.

How to Improve Your Mobility, Posture & Flexibility | Dr. Kelly Starrett

Guest: Dr. Kelly Starrett
Date: 2024-12-09 · Duration: 3:26:10
URL: https://www.youtube.com/watch?v=8N7mdkrXgbc

KEYPOINTS

1. Most people's 'movement language' has shrunk to a few words
Starrett describes a typical day as sit, stand, walk slowly, with exercise that repeats the same shapes. An exercise bike or elliptical, for example, never asks for hip extension. Bodies are adaptation machines, so unused ranges stop being expressed and the brain may stop treating them as safe, which limits the movement options it will allow.

2. Exposure is the first lever for restoring range of motion
Before choosing techniques, Starrett asks how to expose the body to the range you want back. He cites a PT instructor's line that 'muscles and tissues are like obedient dogs': at no age do you stop adapting or healing, though both slow down. Time spent in hip, hamstring and ankle ranges lets tissue adapt.

3. Cultures that live on the floor show fewer age-related problems
Starrett notes that in cultures that toilet, sit and sleep on the ground, fall risk in older adults drops close to zero and rates of hip and low-back osteoarthritis are lower. He offers this as an association, suggesting that regularly using these shapes may tell the body to keep normal hip range.

4. The sit-and-rise test works like a movement vital sign
Cross your feet, lower yourself to the floor with control, then stand up without using hands or a knee. Ideally you should be able to do it with either foot in front. Starrett says the data show it predicts all-cause mortality and morbidity, but its real value is revealing a childhood skill you've lost because you're missing end ranges. He compares such 'movement minimums' to a blood pressure reference.

5. Protect gym time and move maintenance work elsewhere
Starrett criticizes 'decorative' fitness that fills sessions with accessory drills, and recursive training such as doing zone 2 only to do more zone 2. Gym time is 'sacred' and should go to squatting, pressing, sprinting and play. Mobility, floor time and small doses of loading belong at home, such as a loaded bar in the garage for sets while dinner cooks.

6. Pain and stiffness can be handled with the 'D2R2' sequence
Desensitize first (scraping, isometrics, rolling, blood-flow restriction), because a painful tissue can't produce normal force. Decongest next: swollen or congested tissue (including 'cankles' after a flight) is more sensitive and heals more slowly, and muscle contraction drives lymphatic drainage. Then reperfuse, since a pumped, warm tissue often hurts less; one example is a few minutes of leg extensions before heavy squats with an old knee issue. Finally, restore full normal range in the joint.

7. Most pain is an 'incident', not an injury
Starrett reserves 'injury' for pain or dysfunction so severe you can't fill your role at home, at work or on the team, which needs medical care. Everything else is an incident. He borrows Charles Perrow's idea of 'normal accidents' (via Laurence Gonzalez's 'Deep Survival'): breakdowns are often the system expressing itself after a long run of getting away with something.

8. Foam rolling has evidence for pain and range of motion, but it should target something
There's no wrong way to roll, says Starrett, only ways that waste time. The research is clear that soft-tissue work can reduce pain and restore range. He points to Brent Brookbush's institute for research summaries and recommends asking what's stiff or painful today rather than mindlessly rolling the whole body.

9. A tight pelvic floor needs relaxation, not more Kegels
Huberman recounts prostate pain in his 30s with a normal PSA that he traced to a tight pelvic floor. Citing Dr. Michael Eisenberg, he says Kegels can worsen urinary and erectile function when the pelvic floor is already tight. Starrett suggests mobilizing around the pelvis and glutes with a ball, staying away from the sit bones and soft areas and using contract-relax. Pain under compression tells you where the problem is.

10. Hip extension is a weak spot for most people
Starrett ties the back extensors, glutes, hamstrings and calves into one extension system (drawing on Philip Beach and Thomas Myers' Anatomy Trains). Without hip extension, the hamstrings take on extra work. Yoga's camel and wheel poses are useful tests of whole-spine extension, which he prefers to loading one or two segments as in an anterior pelvic tilt. He notes B.K.S. Iyengar introduced blocks and belts to support students into shapes they couldn't reach.

EXAMPLES

1. 10-10-10 at 10
With young kids and two businesses, Kelly and Juliet Starrett did 10 air squats, 10 kettlebell swings and 10 pull-ups at 10 p.m. for 10 minutes whenever they could. He offers this as proof that fitness doesn't need a one-hour block. Another option is kettlebell swings on the minute for 20 minutes in the kitchen.

2. The couch stretch
Starrett devised it on the couch for young athletes watching TV. Kneel facing away from a wall with one knee in the corner and that shin running up the wall, then rise to a high kneel with the front foot planted. Check whether you can squeeze your glutes and breathe normally; if your breath gets small whenever your knee is behind your body, that's a sign of poor hip extension.

3. Neck training and his goalie daughter

Starrett's daughter Caroline, a goalie, trains with an Iron Neck kept by the door. He says each pound of added neck strength sharply reduces concussion risk. Huberman adds that years of neck work (bridges, a four-way neck machine or plate work) have kept him free of the shoulder pain common among his peers.

4. Morning 'spin-ups' for teams

Starrett asks his athletes for 8–10 minutes each morning of one of three routines: a hip spin-up if the back or knee hurts, a shoulder spin-up for shoulder or neck pain, or a breath spin-up, cycling through them otherwise. If someone struggles with the hip spin-up, that reveals their movement and injury history.

5. The 800-gram rule and the three-vegetable dinner

Starrett follows E.C. Synkowski's 800-gram challenge (800 g of fruits and vegetables daily), which crowds out junk without restricting any diet identity, plus protein at every meal from varied, mostly leaner sources. At home, Margaret Garvy's rule of a protein plus three vegetables got even his pickiest daughter eating at least one vegetable.

OTHER RELEVANT

1. Spend 20–30 minutes on the floor each evening

Watch TV or answer email sitting cross-legged, squatting, long-sitting or in a 90/90 position, fidgeting between shapes. Keep a roller nearby so mobilizing takes no extra effort. Everyone, whatever their age, should get down to the ground and back up at least once a day, using whatever support they need at first.

2. Fold play and new skills into warm-ups

Instead of dreaded generic warm-ups, use games, a ball against a wall or a new skill such as David Weck's rope flow, which Starrett says delivers many PNF patterns. Play adds the varied, dynamic movement that rigid programs lack.

3. Supplements in the Starrett household

Kelly takes 5–10 g of creatine most days and doesn't worry about missed days while traveling. His daughter takes creatine, omega-3s (at night to avoid fish burps at school) and vitamin D, which he links to living in a northern climate. He says it's not his expertise, but he has heard early research that vitamin D, creatine and omega-3s might reduce concussion symptoms. He treats whey or vegetarian protein powder as food for filling protein gaps.

How to Control Your Inner Voice & Increase Your Resilience | Dr. Ethan Kross

Guest: Dr. Ethan Kross
Date: 2024-11-25 · Duration: 3:09:02
URL: https://www.youtube.com/watch?v=Og56hmAspV8

KEYPOINTS

1. The inner voice is a mental Swiss Army knife
Ethan Kross, a psychologist at the University of Michigan, defines the inner voice as the ability to silently use language to reflect on your life. It is part of verbal working memory, the system you use to rehearse a phone number or grocery list. It also lets you simulate and plan, such as rehearsing the opening of a talk, and work through problems in the background.

2. Chatter is the inner voice stuck in a loop
Chatter means turning the same negative material over and over without progress: 'what if this happens,' 'I'm such an idiot.' It soaks up limited attention, so the mind cannot solve other problems. Kross calls it transdiagnostic: fill the loop with sad thoughts and it trends toward depression; with fearful ones, toward anxiety.

3. Negative emotions are functional in the right doses
Every emotion serves a purpose when it is not too intense and does not last too long. Sadness after loss turns attention inward, slows the body and signals others to check in, which may explain why sad people reach for sad songs. Harsh self-talk can even motivate, like channeling a tough coach; the problem is getting stuck.

4. Distanced self-talk changes perspective
Kross's first line of defense is coaching himself using his own name and the pronoun 'you': 'Ethan, how are you going to handle this?' These words act like pointing at someone else, shifting you into adviser mode. People are generally better at advising others than following their own advice.

5. Temporal distancing: the 2 a.m. strategy
Every four to six weeks Kross wakes around 2 a.m. with spiraling worry. He asks, 'Ethan, how will you feel about this tomorrow morning?' or next year, or in 10 years. Remembering that it always looks better in the morning signals that distress is temporary, which turns the volume down enough to sleep. Huberman refuses to trust thoughts between 2 and 5 a.m.

6. Venting alone can backfire
Venting strengthens relationships, but if a listener only validates, you leave feeling closer with the problem unsolved, which can become co-rumination. Kross keeps a 'chatter advisory board' of people who first empathize, then help broaden perspective and problem-solve.

7. Writing or talking beats just thinking it through
Thought has no guardrails; writing and conversation impose sentence structure. In research Kross describes, people who wrote or talked about a chatter-provoking event felt better than those who only thought about it. James Pennebaker's expressive writing, 15 to 20 minutes a day for one to three days, is backed by hundreds of studies.

8. Sensory 'shifters' change emotions with little effort
About 95% of people say they listen to music to feel good, yet only 10 to 30% report using it the last time they felt anxious, angry or sad. Music, images and mutually wanted affectionate touch release stress-relieving chemicals and are relatively effortless levers. Kross's sulking daughter perked up when 'Don't Stop Believin'' came on during the drive to soccer.

9. There is no single best tool
In two large COVID-era studies, which tools helped varied enormously between people, and most used three or four a day. Kross compares emotion regulation to exercise: a varied routine works best.

10. Nature restores attention and evokes awe
A walk in a safe natural setting captures attention gently, through flowers, sounds and smells, letting depleted attention recover. Nature, like images from new telescopes or a rover on Mars, can also trigger awe, which shrinks the sense of self and with it the size of your problems.

EXAMPLES

1. Invisible support
Unrequested help can imply someone cannot cope and trigger defensiveness. Instead, quietly pick up the groceries, order pizza for a lab racing a deadline, or share communication tips at a team meeting rather than singling one person out.

2. Tidying as a sign of chatter
Kross's office is messy when life is good, but when chatter strikes he cleans his office, then the kitchen, then his kids' rooms. Researchers call this compensatory control: ordering your surroundings restores a sense of control when your mind feels out of it.

3. Dark intrusive thoughts are normal
Kross sometimes imagines dropping a dumbbell on someone at the gym. Nearly all his students anonymously report a dark thought in the past week. One theory is that the brain constantly simulates unlikely scenarios; knowing that is liberating, as long as you do not act on them.

4. His grandmother's dosing of attention
A Holocaust survivor, she deflected questions with 'why is a crooked letter,' yet grieved openly on one remembrance day each year. Research suggests that flexibly approaching or setting aside painful material can be healthier than always confronting or always avoiding it.

OTHER RELEVANT

1. Use WOOP with if-then plans

Wish, Outcome, Obstacle, Plan: name the goal, picture the payoff, list internal obstacles, then pair each with a specific response, such as 'if I'm tempted to check email after 8, I'll remember being present for my kids.' Kross's own plan: if chatter strikes, use distanced self-talk and time travel; if that fails, take a nature walk and call an adviser.

2. Distract, then check if it returns

If a problem fades after a healthy distraction, move on. If it keeps resurfacing, it needs to be worked through.

3. Mind emotional contagion

Emotions spread within seconds, especially when we are unsure how to feel, in person and online. Leaders should be aware of the tone they set.

4. Load a problem, then exercise

Kross brings an unsolved problem to mind before aerobic exercise and lets solutions surface; chatter blocks this by occupying attention.

How to Improve at Learning Using Neuroscience & AI | Dr. Terry Sejnowski

Guest: Dr. Terry Sejnowski
Date: 2024-11-18 · Duration: 2:34:11
URL: https://www.youtube.com/watch?v=etbfLTHD_VU

KEYPOINTS

1. The brain learns actions by predicting the next reward
Sejnowski, a computational neuroscientist and PhD physicist, says the algorithm the brain uses to learn sequences of actions toward a goal was worked out theoretically in the 1990s and later confirmed with neuron recordings and human imaging. You predict the reward an action will bring, compare it with what you actually get, and use the difference to adjust synapses. Over a lifetime this builds a 'value function' of what is good or bad for you, such as knowing what to order at a restaurant.

2. The same algorithm powered AlphaGo
In AI this is reinforcement learning, the approach DeepMind used to beat the world Go champion. Sejnowski notes Go is to chess what chess is to checkers in difficulty, because many battles unfold across the board at once.

3. Basal ganglia loops run both movement and thinking
The basal ganglia form loops with the motor cortex for actions and with the prefrontal cortex for thinking. The prefrontal loop is among the last to mature, in early adulthood. Sejnowski says adolescents' 'no-go' circuitry often doesn't yet kick in to stop actions that aren't in their interest.

4. Procedural learning beats book learning for fast, expert skills
Cognitive learning is step-by-step and inefficient; procedural learning becomes automatic. You can't learn tennis from a book. As a physicist, Sejnowski says solving problem sets, not memorizing equations, made him competent. Huberman adds that knowing the mechanism behind a protocol and then practicing it reinforces both.

5. Sleep spindles move the day's learning into long-term memory
Recording from epilepsy patients who spend about two weeks in hospital with brain electrodes, Sejnowski's team found spindles (bursts of 1–2 seconds in non-REM transitional stages) traveling in circles around the cortex. Spindles help consolidate the hippocampus's replay of daytime experience into cortical storage. Getting enough sleep is the first lever, and the two discuss research linking daytime exercise to more spindles.

6. Every brain hack has a cost
The Ambien finding (below) shows you 'don't get anything for free.' Huberman extends the point: low-dose testosterone therapy can bring vigor but is like a second puberty, and puberty is one of the fastest phases of aging. Growth hormone can likewise give vigor while visibly aging skin. He says he is neither for nor against them; responses are highly individual.

7. Aging thins connections but preserves old memories
Infants overproduce synapses and then prune them because synapses are energetically expensive. Pruning slows but continues with age, so the cortex thins. Memories laid down young remain 'rock solid' and form the foundation for later learning, and adults can still learn, if less quickly.

8. Mitochondria explain falling vigor, and exercise restores it
With age, mitochondria become fewer and less efficient, so learning costs more energy. Some prescription drugs can also harm mitochondria. Sejnowski calls exercise 'the best drug you could ever take' because it benefits every organ, including the brain. He runs on the beach below the Salk Institute daily and climbs back up the roughly 340-foot cliff.

9. Ketamine reveals a glutamate side of schizophrenia
Ketamine blocks NMDA glutamate receptors and reduces inhibitory interneuron signaling, raising cortical excitation. People who use it at parties two days in a row can arrive at emergency rooms in full psychosis, with auditory hallucinations and paranoia indistinguishable from a schizophrenic break, which resolves after a couple of days of isolation. Sejnowski believes large language models could have flagged this connection 20 years earlier.

10. Parkinson's alters the sense of speed
Dopamine neurons, which carry the reward-prediction signal for procedural learning, are vulnerable to toxins such as pesticides. When the first L-DOPA trials began, people who had been 'locked in' started talking again. Parkinson's patients who move slowly feel they are moving fast, yet they can move at normal speed if asked, suggesting the brain's internal set point for speed has shifted.

EXAMPLES

1. Ambien doubled spindles and next-day recall
In Sara Mednick's experiment, people learned material at night and then took zolpidem (Ambien). Sleep spindles doubled, they remembered about twice as much the next morning, and the memories stayed stable. The catch: the drug strengthens memories formed before the dose but can erase those formed after it, so some people wake in a hotel room with no memory of getting there.

2. The 'Learning How to Learn' course
Built with Barbara Oakley, the free online course has about 50–60 videos of roughly 10 minutes each over a month, with quizzes and forums. It was aimed at high school and college students, but enrollment peaks at ages 25–35. These are working adults, half of them college graduates, who need new skills but can't return to school.

3. Education and Alzheimer's onset in China
A study Sejnowski heard about from the head of an Alzheimer's program compared peasants with almost no education, high

school graduates and highly educated people. Alzheimer's onset came earliest in the least educated and latest in the most educated. He suggests mental exercise builds reserve, while acknowledging no one knows the cause.

4. Huberman's 'cognitive velocity' drill

Huberman reads just slightly faster than his reflexive pace while still trying to retain the content. He feels the energetic demand and backs off and pushes forward to find the sweet spot.

5. Ideas on the run, captured by voice memo

Sejnowski gets his best ideas walking or jogging with no music or podcasts, and used to forget them by the time he reached his office. Now he records voice memos. Psychologists call this mind wandering, and it is linked to 'aha' moments.

OTHER RELEVANT

1. Practice, don't just read

For any skill that must run fast and accurately, drill it the way you would clearing a scuba mask in a pool or working through problem sets.

2. Protect sleep after learning

Spindles do the consolidation, so cutting sleep after a day of learning undercuts it. Avoid relying on sleep drugs for this purpose given the amnesia trade-off.

3. Exercise daily to bank energy reserves

Sejnowski frames exercise as storing reserves for later life, and pairs it with lifelong learning.

4. When stuck, step away

Learning How to Learn teaches students to stop beating their heads against a problem and take a walk or do the dishes. They often see the answer when they come back. Build input-free time into your day rather than filling every gap with your phone.

How to Deal With High Conflict People | Bill Eddy

Guest: Bill Eddy
Date: 2024-10-28 · Duration: 2:39:21
URL: https://www.youtube.com/watch?v=SuR0DaYoe0Y

KEYPOINTS

1. A high-conflict personality is defined by a pattern of blame
Eddy, a family lawyer, mediator and licensed clinical social worker, describes high-conflict people as preoccupied with blaming others, so conflicts escalate rather than resolve. As a hospital social worker he would fix one crisis, such as a marriage, a job or an eviction, only for the next to appear the following day. In family court he saw the same issues stuck for years in litigation that couples settled in two or three mediation sessions, because personality, not the legal question, was driving the fight.

2. High-conflict personalities overlap with personality disorders but aren't the same thing
Personality disorders involve a narrow, repeated range of interpersonal behavior. Eddy estimates roughly half of people with one are also high-conflict blamers. Others are self-centered without blaming, or more frustrated with themselves than with anyone else. What matters to him in practice is the pattern, not the diagnosis.

3. Prevalence figures come from a large NIH study from the early 2000s
Eddy cites a study by the alcoholism division of the NIH, which hasn't been repeated: narcissistic personality disorder about 6% of US adults (62% male), borderline about 6% (53% female, 47% male, which surprised clinicians), antisocial about 4% (75% male), histrionic about 2% (about 50/50) and paranoid about 4%. Borderline and narcissistic overlapped in around 38% of cases. The current DSM puts all personality disorders at about 10% of people, and that US study found 15%. He notes the numbers are 20 years old and culture may have shifted them.

4. Some high-conflict people look extremely reasonable
People with borderline or histrionic traits tend to be openly dramatic, but some with antisocial or narcissistic traits have spent a lifetime looking good. Eddy describes calm abusers in court explaining that they held a partner down "for her own safety" while the other party appears distraught. He notes that about 80% of people in divorce court now represent themselves, so judges often have little else to go on.

5. Wait a year before committing
Because these patterns emerge in close relationships, often after about six months or right after a commitment, Eddy advises against getting engaged, married or having children in the first year. Living together can actually help, since it shows how someone reacts to small irritations or a bad night's sleep. He isn't dismissing whirlwind romances that last decades, but says earlier generations usually knew their partner's family and history, while today's partners can hide much more.

6. High-conflict emotions are contagious and recruit negative advocates
Cluster B disorders are described clinically as dramatic, emotional and erratic. Eddy, attributing it to the amygdala, says intense fear and anger spread to listeners, so lawyers, therapists and relatives become emotionally hooked but uninformed. A demand to "destroy" the other party is a warning sign.

7. They seem stuck in the grieving process
Eddy's own theory, which he says awaits neuroscience, is that high-conflict people get stuck at denial and anger instead of moving through to acceptance. That's why they keep retelling past grievances to anyone who will listen. It's also why focusing on the past or on feelings tends to drag them back into the hurt.

8. Don't label anyone
Eddy is emphatic that you should never tell someone they're high-conflict or have a personality disorder. You might be wrong, it never motivates anyone, and it sets off their defensiveness. Use the concepts privately to adapt your own behavior. He notes that 90% or more of people are not in this group.

EXAMPLES

1. The congressman at baggage claim
Eddy describes a California congressman who cut a baggage line, shouted "Don't you know who I am?" and shoved an airline worker to the ground. Half the public excused it as sleep deprivation. Applying his rule that 90% of people would never do this, Eddy predicted trouble. Once elected mayor, the man was accused within about eight months of harassing women and alienating his staff, and he left office.

2. Sanctioned false abuse allegations
In one custody case a mother made knowingly false allegations of child sexual abuse and brought relatives and a roommate as advocates. The judge sanctioned her, ordering $110,000 in fees and costs under a statute covering knowingly false abuse allegations, after the father had spent about $40,000 on an evaluation and trial. The family yelled at the judge and were threatened with removal. She never paid, having put her assets in other people's names. Eddy stresses that he sees both true and false allegations.

3. Hang up, and they come back civil
An unrepresented husband kept cursing about Eddy's client. Eddy set a limit, warned he'd hang up, and did. The next morning the man called back and agreed to avoid the insults. Eddy's point is that the consequence, not the limit itself, is what changed the behavior.

4. Domino's 90-second reply
After two employees posted a disgusting video and the stock fell by about 10%, the CEO released a brief video saying the

former employees didn't represent the company and that customers came first. The company recovered. Eddy uses it as an example of a BIFF response: brief, informative, friendly and firm.

5. Watch how they treat staff

Huberman says he once turned down a job because of a brief, dismissive interaction between the would-be boss and a janitor. Eddy describes an executive who posed as a taxi driver to see how job candidates treated him before their interviews.

OTHER RELEVANT

1. Use the WEB method to spot patterns

Pay attention to their Words (blaming, all-or-nothing), your own Emotions (a gut sense that something is disproportionate) and their Behavior (things 90% of people would never do). Check whether the same problems appear across settings, and treat warning signs such as "never talk to my family" or a lack of any long-standing friendships seriously.

2. Leave without blame, gradually

Avoid a direct hit ("you do this and this") and avoid self-blame ("I'm defective"). Both feed their story. Say something neutral, like "we've grown in different directions." Exit in a few steps so they can adjust, but not so many that hopes rise. Don't go back and forth or pour out your feelings, which Eddy says can precede violence. Expect "hoovering," a switch from rage to pleading or seduction, and don't give in if you're sure it's over.

3. The four forget-about-its

Forget about giving them insight into themselves, focusing on the past, dwelling on emotions (ask "what do you think of this proposal?" rather than "how do you feel?") and using labels. Turn the conversation outward to options and next steps.

4. CARS: Connect, Analyze, Respond, Set limits

Connect with an EAR statement showing empathy, attention or respect. One of the three is often enough, and it must be genuine. Analyze by offering choices, having them write lists, or asking for a proposed solution. Respond with a BIFF message. Set limits with consequences you're ready to enforce, which Eddy calls SLIC. One worker who began greeting her difficult boss with genuine interest became the boss's favorite employee within a month.

5. Teach kids the four big skills

Eddy's New Ways for Families program teaches flexible thinking, managed emotions, moderate behavior and self-checking. If a child says Dad ignored their drawing, a reasonable parent helps the child manage that relationship rather than saying "your dad's a jerk," which Eddy links to parental alienation.

How to Improve Memory & Focus Using Science Protocols | Dr. Charan Ranganath

Guest: Dr. Charan Ranganath
Date: 2024-09-30 · Duration: 2:39:08
URL: https://www.youtube.com/watch?v=jC8Pu9HBd48

KEYPOINTS

1. Memory is for navigating the present and predicting what comes next
Ranganath, a memory researcher at UC Davis, argues that we never perceive the present raw. The brain builds a predictive model from semantic memory (knowledge) and episodic memory (events), which tells it what to ignore and what is surprising. That is why about 40% of viewers miss the gorilla walking through the basketball video. It is also why waking in an unfamiliar dark room, or with jet lag, can briefly leave you lost: you have to actively retrieve how you got there.

2. Curiosity creates a state that boosts memory for unrelated information
In his trivia study, the more curious people rated themselves (on a 1–6 scale), the more activity appeared in dopamine-rich midbrain and nucleus accumbens regions. That activity was driven by the question, not the answer. Faces shown during curious states were remembered better even though they had nothing to do with the trivia. Ranganath cautions that fMRI measures metabolic activity, not dopamine directly.

3. The prefrontal cortex 'biases the competition' toward what matters to your goals
The prefrontal cortex makes up about a third of the primate brain and provides cognitive control. Patients with prefrontal damage can repeat digit strings and learn the Wisconsin Card Sorting rules, but they fail once distractions appear, because the environment rather than their goals steers attention. Prefrontal signals keep goal-relevant neurons active even when something shinier competes.

4. Age-related memory decline is largely about white matter and control, and much of it is preventable
Hypertension and diabetes damage white matter, the long-range wiring connecting the prefrontal cortex to the rest of the brain. With weaker control, irrelevant details get remembered at the expense of important ones. Ranganath frames this as one of the most preventable aspects of cognitive aging.

5. Healthy lifestyle factors roughly doubled memory performance over a decade
Ranganath cites a study of 29,000 people in China followed for 10 years, which tracked factors such as exercise, cognitive and social engagement, a healthy diet, not smoking and limited alcohol. Everyone started out similar. After ten years, those with four to six healthy factors scored almost twice as high on memory tests as those with zero or one.

6. Attention can be captured by anything; intention decides what you keep
Ranganath distinguishes attention, which anything salient can grab, from intention, the deliberate sense of what you want to take away from an experience. Many everyday memory 'failures' are really failures of intention at the time of encoding.

7. Multitasking fragments memories and drains cognitive control
Switching between tasks saps executive control, creates fragmented memories and raises stress. Even an unacted urge to check your phone costs some control. Ranganath says the people who think they are great multitaskers are not.

8. Recalling a memory changes it
Each time you retrieve a memory it becomes more accessible but also more abstract and story-like, and less immersive. Traumatic memories are hard to update because intense neuromodulator release during the event locks them in, and retrieval can retraumatize. Ranganath suggests a strong prediction error, or therapies that open a window of plasticity, may help reframing.

9. Déjà vu is familiarity without recollection
Familiarity is processed in the perirhinal cortex, separate from recollection of the actual episode. Anne Cleary's virtual reality studies created rooms that shared the exact spatial layout of earlier rooms but had a different 'skin', such as a museum versus an arcade. These reliably triggered déjà vu: enough overlap to feel familiar, with a mismatch that blocks recollection.

EXAMPLES

1. Rebecca Burwell's stimulation experiment
By stimulating the perirhinal cortex of rats at beta versus gamma frequencies, Burwell could make novel objects seem familiar and familiar objects seem novel. This changed how long the animals explored them.

2. Hearing, vision and teeth as memory protectors
Ranganath says effect sizes for treating hearing loss are strong for reducing dementia risk. He notes a Lancet public-health recommendation to screen hearing and encourage hearing aids, and says treating cataracts matters too. Gum disease is linked to Alzheimer's risk, possibly via inflammation; Huberman mentions cavity bacteria entering the bloodstream. Ranganath had custom earplugs made for playing in his loud band.

3. Ranganath's ADHD and values work
He describes his own ADHD and an ADHD coach who had him write down and rank his values. Before a dreaded meeting or admin task, he now asks 'why am I doing this?' and links it to a value. He calls this game-changing, though it takes conscious effort.

4. Concert photos versus the experience
Filming a whole show can leave you remembering the act of filming rather than the friends and feelings. Ranganath took a few deliberate pictures when he finally saw the Descendents. Revisiting such photos later and recalling the emotions around

them strengthens access to the memory.

5. Huberman's separate social-media phone

Huberman keeps social media only on an old phone stored in a box, with a daily timer that he keeps shortening, and says the productivity gains have been enormous. Ranganath calls it engineering your environment to regain control.

OTHER RELEVANT

1. Cover the health basics first

Sleep, exercise, a sensible omnivorous diet, social and cognitive engagement, no smoking and limited alcohol carry the strongest evidence. Controlling blood pressure and blood sugar also protects white matter.

2. Protect your senses and gums

Get hearing checked and use hearing aids if needed, wear earplugs around loud music, treat cataracts, and keep up oral hygiene.

3. Do one thing at a time and remove the cues

Silence alerts, separate distracting apps from your working devices, and protect blocks of single-task focus.

4. Use curiosity on purpose

Before learning something, generate questions you really want answered. The curious state primes memory for what follows.

5. Take fewer, more intentional photos and revisit them

Decide what you want to remember, capture a few images, and later spend a few minutes recalling the emotional context.

How to Heal From Post-Traumatic Stress Disorder (PTSD) | Dr. Victor Carrión

Guest: Dr. Victor Carrión
Date: 2024-09-23 · Duration: 2:26:59
URL: https://www.youtube.com/watch?v=4RFEkGKKhdE

KEYPOINTS

1. Stress follows an inverted U; trauma sits past the peak
Carrión, a Stanford child psychiatrist, describes stress as helpful up to an optimal point — caring about tomorrow's exam, or a vaccine challenging the immune system — beyond which it carries a physiological cost (allostasis). Traumatic stress threatens your physical integrity. Resilience and post-traumatic symptoms are both possible outcomes, and recovery means returning to that optimal point, not eliminating stress. He worries that overprotecting kids from all stress robs them of chances to build coping skills.

2. 'PTSD feeds on avoidance'
That is his team's slogan. Pretending nothing happened, or that treatment isn't needed, lets symptoms deepen and become complicated by substance use and self-injury, which makes treatment harder. Ruminating alone doesn't help either: in children, trauma turns play into joyless, repetitive play, and people usually fixate on the wrong event.

3. PTSD is usually a backpack, not a single event
Most people carry an accumulation of stressors (allostatic load). Most existing trauma treatments targeted one event and required parent participation, which fails when a parent is the source of trauma, is avoidant, or would lose their job for missing work. That gap is why Carrión developed his own treatment.

4. Many kids have impairing symptoms without a formal diagnosis
Children struggling in school and relationships often fall short of the behavioral criteria for PTSD. Carrión therefore studied stress symptoms across a spectrum. He firmly believes ADHD exists, but he saw children sent to him with ready-made ADHD diagnoses and stimulant plans whose problems were trauma. The two can also coexist, and ADHD inattention can raise the risk of PTSD.

5. Children with PTSD symptoms keep bedtime cortisol high
Measured before breakfast, lunch, dinner and bed, these children showed a normal daily cortisol rhythm except at bedtime, when levels stayed above those of healthy controls. That fits their night-time symptoms: bedwetting, nightmares, and short or shallow sleep.

6. Higher cortisol tracked with hippocampal changes over time
A cross-sectional MRI study found no hippocampal volume difference, which Carrión saw as a window to intervene. In a small longitudinal sample, though, higher pre-bedtime cortisol correlated with smaller hippocampal volume. On memory tasks, children with symptoms activated fewer hippocampal voxels and showed weaker ventromedial prefrontal activity, consistent with a quick-firing amygdala lacking its prefrontal 'brake'.

7. Transgenerational trauma: genes and learned behavior, epigenetics unproven
Carrión says the jury is still out on whether stress-induced genomic changes pass to offspring, though vulnerability genes clearly do. He has treated children with full PTSD symptoms and no identifiable trauma, where the trauma surfaced in a parent's history. Avoidance, hypervigilance and mistrust had been learned across generations.

8. Cue-Centered Therapy is multimodal and child-led
It combines CBT with psychoeducation (what cues and classical conditioning are, that recovery is possible), self-efficacy, empowerment and insight work, and it can be done without parents. In trials it reduced anxiety, depression and PTSD symptoms as rated by both children and observers, and untreated parents' anxiety also fell. It is published as an Oxford therapist manual, and an adult adaptation is underway.

9. Self-chosen tools work best
Children start with an empty toolbox. They are taught breathing, muscle relaxation, positive thinking, mindfulness and simple yoga poses such as mountain pose, but they decide which cues matter and which tools to keep. Tools they invent themselves work best; teammates and sports come up often. The underlying message is that the most portable tool is yourself.

EXAMPLES

1. The orange-juice tool
A girl returned after a week much improved. She had forgotten the taught techniques and instead drank a glass of orange juice whenever she felt bad. Carrión validated it, since what mattered was the message that 'I can take care of myself.'

2. East Palo Alto yoga and mindfulness classrooms
After about three months of yoga and mindfulness in two classrooms, the principal asked what was going on because none of those students had been sent to her office. A larger study with the nonprofit Pure Power trained the teachers themselves, two to three times a week for 15–50 minutes. The headline finding: about 73 minutes more sleep on average, with deeper sleep confirmed by at-home polysomnography.

3. Puerto Rico island-wide rollout
After Hurricane Maria, more hurricanes and earthquakes, Puerto Rico — a single school district — is training all its teachers in the yoga and mindfulness curriculum and pairing it with Cue-Centered Therapy at scale for the first time, as a model for districts like New York and LA.

4. Mini-brains exposed to cortisol
With Stanford geneticist Alex Urban and a postdoc in his lab, skin cells are reprogrammed into neurons that grow into

organoids and are exposed to cortisol. Epigenetic analysis flagged known PTSD-linked genes such as glucocorticoid receptor genes, plus novel collagen-related genes Carrión links to stress-accelerated aging. Cheek swabs from the Puerto Rico students will test which genes predict resilience and treatment response.

OTHER RELEVANT

1. Break a reaction into four corners

Map a reaction (screaming, bolting from class) onto a square: thoughts, emotions, body sensations and actions. Start with whichever corner the person relates to, whether that's a headache for a child without emotional vocabulary or 'what if I don't run?' for an action-oriented one. Changing one corner usually shifts the others, building a 'cube' of alternative responses. Huberman calls this a concrete version of 'creating space'.

2. Practice positive thoughts when calm

Rehearse coping thoughts outside the stress response, too ('I'm not bad; this is the cue'). Later, rework the narrative to correct distortions like 'it was my fault' and move from victim to survivor.

3. Use controllable stressors to build agency

Carrión stresses that a sense of control matters, such as choosing to keep anti-anxiety pills in a pocket. Huberman's view is that deliberate cold exposure, done safely, offers a controllable way to practice working with your own stress response.

4. Protect sleep as a first-line lever

Both treat sleep as a recalibrator of the autonomic 'seesaw' (hyperarousal versus dissociation). Avoid treating a child's attention problems as ADHD without asking about stressors at home.

How to Find, Build & Maintain Healthy Romantic Relationships | Esther Perel

Guest: Esther Perel
Date: 2024-09-16 · Duration: 2:06:14
URL: https://www.youtube.com/watch?v=ajneRM-ET1Q

KEYPOINTS

1. We enter relationships both to find ourselves and to become someone new

Perel says everyone carries dual needs: security and freedom, togetherness and separateness. We are often drawn to a partner who embodies a part of us we want more of, or have disowned. The irony is that the trait that first attracts us later becomes the source of conflict, because we want change, but only up to a point and on our own terms. Her example: you love a partner's stability and punctuality, later call it rigidity, and your own wish to become more reliable quietly disappears.

2. Cornerstone and capstone relationships ask for different things

Couples who meet in their early 20s build a 'cornerstone' relationship, forming identities together. People who meet a decade later have usually defined themselves, so the partner is a 'capstone' that confirms an identity. Young couples risk crisis when each starts changing individually and the shared 'vest' feels too tight; later couples must generate the energy to merge two finished lives.

3. Many people will have two or three marriages, sometimes with the same person

Perel argues Western adults now often have two or three relationships or marriages, some with the same partner if the relationship keeps redefining itself. Huberman ties this to Erikson's lifelong developmental stages. It is creative redefinition, not just surviving crises: the goal is a relationship that is alive, not merely 'not dead'.

4. Curiosity is the opposite of reactivity

Reactivity creates rapid, narrow cycles of defense, attack and blame. Curiosity is an active engagement with the unknown, and both agree it works best without attachment to a particular outcome. Perel's work is largely about moving couples from reactive to curious. That is hard because a hurt, defensive body is wired for shutdown and self-protection, which works against what the person needs psychologically.

5. Couples confuse their story with the facts

Perel calls much of couples' arguing 'pseudo-factual talk': each person's account of last night is valid as an experience but is still a subjective rendering. She compares two partners' versions to Swiss cheese, where everything one leaves out is exactly where the other's story begins. Implicit memory from earlier life drives the conscious narrative, and our need for coherence can push us to decide that if I feel hurt, you must have meant to hurt me.

6. Conflict has three 'verb states'

Under threat, couples fall into three patterns: both pursue (fight-fight escalation), both withdraw (flight-flight), or one pursues while the other distances. In her example, one partner follows the other through the house feeling the silent treatment of childhood, while the other feels invaded, as they did in a chaotic family home. At that point their younger selves have taken over. The first step is to shift from the story to physiology and feelings.

7. Apology is between two people; forgiveness is your own freedom

A real apology acknowledges how the other person felt, not just that a mistake happened. Some people can't accept a sincere apology because accepting it would seem to shrink a big grievance. Perel cites the Jewish tradition of apologizing three times, after which the burden passes to the person who refuses. Accepting an apology is still not forgiving. Forgiveness happens on your own timeline and can happen alone.

8. People who can't apologize usually struggle with shame

Quoting a friend, Perel defines self-esteem as being able to see yourself as flawed and still hold yourself in high regard. If admitting a flaw means something is wrong with you, saying 'I'm sorry' becomes nearly impossible. She separates shame from responsibility, and real empathy from 'empathic distress' that stays focused on yourself.

9. Love and desire can feed each other or pull apart

Combining love, security and erotic desire in one relationship is, in Perel's words, the grand experiment of modern love. For some people the two are inseparable. For others they are split, often because they learned to love with extra burden, for example by parenting a depressed or alcoholic parent. Desire means owning your wanting, and that is hard to reach next to someone you feel anxiously responsible for. Drawing on Michael Bader's work, she calls this one of the more common patterns.

10. Affairs are often about finding another self, not another partner

Perel says she has seen plenty of infidelity in happy relationships. Some affairs respond to loneliness, neglect or sexual rejection, while others have little to do with the partner. The word she hears worldwide is 'alive': the erotic, which she defines as vitality, curiosity and playfulness rather than sex, acts as an antidote to deadness. She is explicit that this is not a justification. Affairs still involve betrayal and lying, but also longing and loss.

EXAMPLES

1. A wedding vow Perel recommends

'I'll screw up on a regular basis and on occasion I'll acknowledge it.' She uses it to show what self-awareness and accountability without blame look like. After nearly 40 years as a couples therapist, she says partners often treat therapy as a 'drop-off center' for a partner they want fixed, without seeing themselves as part of the system.

2. The late-dinner apology

Huberman sketches a fuller apology for coming home at 9 instead of 7 without calling: own the mistake, then validate that the

partner's upset makes sense. If it still lands badly, Perel and Huberman point to patterns, such as repeated apologies with no change, or a backlog of unvoiced resentments behind the single event.

3. The cup of tea in a session

When both partners are flooded, Perel may sit in silence for 10 minutes, put on music, or stop the session. Sometimes she asks when one last made the other a cup of tea: being able to make tea for someone you'd like to strangle shows love and hate coexisting.

4. The love/desire page exercise

Draw a vertical line down a page. On one side, finish prompts like 'When I think of love I think of…', 'When I am loved I feel…'. On the other, do the same for sexuality and desire. Words that appear in only one column show how thick the line is between the two for you. Couples can do it at the same time and read their answers aloud.

5. Abandonment vs. suffocation

In many couples, one person fears losing the other and one fears losing themselves. Perel says this role is usually stable within a relationship but can flip from one relationship to the next.

OTHER RELEVANT

1. Repair before revival

Perel's sequence after a hurt or betrayal starts with acknowledgment, remorse and guilt for the consequences, even if you think the act was justified. Next, avoid sliding into self-flagellating shame, which keeps you at the center. Then show the partner they matter through daily attention, becoming the 'vigilante' who protects the relationship. Repair is not yet healing. Revival comes from doing new, risky, playful things together, not from returning to the status quo.

2. Ask: 'Knowing yourself, what makes it hard to live with you?'

Perel asks this in early sessions as a readiness check. No one is fully ready. Everyone has relationship issues to work through, and the only question is with whom. Many relationship problems are paradoxes to manage, not problems to solve.

3. Explore your erotic blueprint

Ask where you go in sex, whether that is connection, surrender, being cared for, being 'safely powerful' or play. Perel treats sexuality as a coded language for emotional needs, wounds and longings shaped by how you were cared for. For apologies, she recommends Harriet Lerner's book on apology, which separates moves aimed at self-preservation from real repair.

How to Cultivate a Positive, Growth-Oriented Mindset | Dr. Jamil Zaki

Guest: Dr. Jamil Zaki
Date: 2024-09-02 · Duration: 2:16:42
URL: https://www.youtube.com/watch?v=U2BPitASUh0

KEYPOINTS

1. Cynicism is a theory about people, not a sign of intelligence

Psychologists define cynicism as the belief that people are fundamentally selfish, greedy and dishonest, and that kindness is a thin veneer. Zaki, a Stanford psychologist, stresses that this is a theory you bring to the world. Echoing Kurt Vonnegut's "we are who we pretend to be," the cynic is really deciding who everyone else is, and it shapes every decision they make.

2. Cynicism becomes a self-fulfilling prophecy

Cynics keep their guard up even with partners and family, and tend to monitor, test or threaten others to avoid being betrayed. People notice and reciprocate, so the cynic brings out the selfishness they expected and ends up living in a story full of villains.

3. Cynicism is not the same as skepticism

Zaki compares cynics to lawyers prosecuting humanity: the verdict is in, and contrary evidence gets explained away, often by imagining hidden motives. Skeptics think like scientists and update on evidence without any naivety. He calls cynicism a mirror image of gullibility: mistrusting in a credulous, unthinking way. He contrasts it with Phil Tetlock's integrative complexity, holding several views and weighing the evidence.

4. Mistrust creates a wicked learning environment

In Bayesian terms, your prior should update with new data. But if you never trust, you never find out whether someone would have honored it. Betrayals are vivid and remembered, while missed opportunities stay invisible. So cynicism protects itself from correction.

5. Its roots can trace to insecure attachment

In the Strange Situation test, about two-thirds of one-year-olds are securely attached and the rest insecure. In one looking-time study, insecurely attached infants stared longer at videos of stable, loving reunions, as if surprised by them. Securely attached infants stared longer at unstable ones. Zaki says this early expectation about whether people can be counted on elaborates into generalized mistrust later in life.

6. Cynicism tracks poor health, and we wrongly admire it

Large prospective studies link cynicism to lower life satisfaction, more depression and loneliness, more inflammation and heart disease, and higher all-cause mortality. Zaki notes these are correlational but well-controlled. In surveys, about 70% of people pick a cynic for a hard intellectual task and 85% think cynics are socially wiser. Olga Stavrova's "cynical genius illusion" paper found cynics actually score lower on cognitive tests, and other work shows they're worse at spotting liars.

7. Environment shapes trust

Among nations, more economically equal societies trust more, as Kate Pickett and Richard Wilkinson describe in The Spirit Level. Inequality breeds a zero-sum mindset. In the US, the share agreeing most people can be trusted fell from about half in 1972 to about a third in 2018, a drop Zaki compares to the stock market's fall in 2008. He says cynicism tends to be stable and to apply across life domains, and contrary to the grumpy-elder stereotype it declines in older adulthood.

8. Social media and news feed a mean-world view

Zaki cites William Brady and Molly Crockett's finding that outrage posts get amplified and rewarded, so users ratchet up their outrage. Claire Robertson found that 90%+ of political tweets come from the 10% most active users. The average person scrolls about 300 feet of feed a day, roughly the height of the Statue of Liberty, mostly drawn from the fringes. He links this to "mean world syndrome," in which heavy news viewers believe crime is rising even when it's falling.

EXAMPLES

1. Cynics don't benefit from support

In a stressful impromptu-speech task, having a friendly stranger cheering them on roughly halved most participants' blood-pressure rise. For cynical participants, the spike was just as large with support as without. Zaki describes social connection as nourishment that cynicism stops you from absorbing.

2. Ocean versus lake fishermen in Brazil

In economist Andreas Leibbrandt's study of two similar villages 30 to 40 miles apart, ocean fishing required teams and heavy boats, while lake fishermen worked alone and competed. Early in their careers, both groups were equally trusting and trustworthy in economic games with strangers. Over time, the ocean fishermen became more trusting and trustworthy and the lake fishermen less so. Zaki notes that each group was right given its environment.

3. The trust game

An investor can send $10 to a stranger, the money is tripled, and the trustee decides how much to return. Huberman guessed that 55% of trustees return money, matching typical forecasts of 52 to 55%. In work by Fetchenhauer and Dunning, about 80% actually do.

4. We misjudge the other political side

Democrats estimate that 25% of Republicans earn over $250,000 a year; the real figure is 2%. In Emile Bruneau's data on immigration, actual preferences of the two parties overlap a lot, but each side pictures the other at the extreme. People think rivals hate them about twice as much as they do. Work from Rob Willer's group found they overestimate the other side's support for violence by about 400%. More than 80% across the spectrum want less conflict.

5. Moral beauty is the most common source of awe

Zaki cites Dacher Keltner's finding that the top source of awe isn't redwoods or space footage but everyday acts of kindness and compassion. Cynicism's physics-like rules about people blind you to it.

OTHER RELEVANT

1. Be skeptical of your own cynicism

Zaki, who admits his default setting is suspicious, uses a CBT-style check: "Defend your inference. What's the evidence?" Usually it's thin. Huberman adds Byron Katie's questions: Is it always true? What would it mean if it weren't?

2. Adopt a reciprocity mindset

Trust tends to be earned back: people trusted tend to become more trustworthy, and those mistrusted less. When deciding whether to trust, ask not only about your risk but what your trust could do for the other person and the relationship.

3. Practice social savoring

Zaki runs savoring "classes" with his kids, such as eating ice cream or watching a sunset slowly. He realized the gossip they heard from him skewed negative, so he began sharing positive things he notices about people. Looking for examples to tell them changed what he notices.

4. Take leaps of faith, then count the encounters

Research by Nick Epley, Juliana Schroeder and others finds people expect conversations with strangers, vulnerable disclosures and disagreements to be far worse than they turn out. Take calculated social risks. When an encounter beats your expectations, like Zaki's first political talk with a relative he'd known for 30 years, write it down so the lesson sticks.

5. Leaders: show people to themselves

Zaki anonymously surveys organizations and typically finds a large majority want cooperation over competition, while people assume their peers don't. Sharing the real numbers gives what he calls peer permission to act on values that were there all along.

Optimal Protocols for Studying & Learning

Date: 2024-08-26 · Duration: 1:41:39
URL: https://www.youtube.com/watch?v=ddq8JIMhz7c

KEYPOINTS

1. Learning is mostly a matter of offsetting forgetting
Huberman's central frame: we forget most of what we encounter each day, which is a good thing. People with rare clinical conditions in which they remember everything struggle in work and relationships. Studying well means deliberately guarding chosen information against that natural forgetting. The research doesn't support doing it by matching your 'learning style'. What works is engaging the memory systems that offset forgetting.

2. Plasticity works by rewiring existing connections
New neurons are added in the hippocampus's dentate gyrus, but that isn't the main route to adult learning. Learning comes from strengthening, weakening or forming connections between existing neurons. Weakening isn't necessarily forgetting. Brain development from infancy to adolescence is largely the removal of connections, while the remaining ones become more robust. That's why a toddler eating spaghetti is clumsier than a teenager.

3. Strain during learning is the signal to change
The agitation you feel forcing focus reflects release of epinephrine (adrenaline) and other neuromodulators that flag circuits to change later. Hydration, enough caffeine to be alert but not jittery, and, for diagnosed ADHD, a conversation with a doctor about medication can all help. Huberman also cites Wendy Suzuki's NYU work: 5–10 minutes a day of mindfulness meditation, returning attention to the breath, improves focus and memory. Missing a day doesn't matter.

4. The rewiring happens during sleep and NSDR
Connections are actually reordered during deep sleep and sleep-like states, not while you're studying. Because of the 'first-night effect', most of what you learn that day is consolidated the following night. A poor night doesn't erase it, but late caffeine and all-nighters work against learning. Huberman recommends 10–20 minutes of non-sleep deep rest (NSDR, related to yoga nidra) at any time of day, and adds that more data on it are emerging.

5. What top students do
In a self-report study of nearly 700 medical students, the best performers scheduled study time, put their phones away, told friends and family they'd be unreachable, studied alone, studied 3–4 hours a day in two or three sessions at least five days a week, and taught peers. Huberman flags that the data are correlational. The top students also held a broad, aspirational sense of how their studies would change their lives and families.

6. Testing is a learning tool, not just evaluation
Research on this goes back more than 100 years. In a 1917 study, schoolchildren who read a biography once and then repeatedly recalled it in their heads 'vastly outperformed' children who reread it the same number of times, in both the amount and the accuracy of what they recalled. Even scoring 40–50% on a test right after studying beats rereading, as long as you then learn the correct answers.

7. Rereading creates false confidence
Students exposed to material four times predict they'll do best. Those who studied once and were tested three times feel less confident, but they perform far better. Huberman calls this the difference between familiarity (recognizing something) and recollection (bringing it to mind and using it). He cites a review in the journal Hippocampus.

8. Timing matters: test soon after first exposure
Comparing three schedules, the best results came from studying, testing the same day or next day, then a long delay before the final exam. Spacing tests evenly was in the middle. Waiting until just before the exam to test was worst. So spend a few seconds or minutes recalling the material as you leave class, before reaching for your phone.

9. Use open-ended questions
Short-answer or long-answer questions with minimal prompts force recollection. Standard multiple choice can be answered on familiarity, except for 'trick' formats like the GRE, LSAT or MCAT, where distractors demand mastery. Announcing that there will be frequent quizzes beats pop quizzes, which students resent.

10. Emotion strengthens memory
Epinephrine and norepinephrine can produce one-trial learning, as with witnessing a car accident, and also underlie PTSD, which is treated with exposure therapy, EMDR or medication. Excitement or story in material helps it stick. With a monotone source, you have to generate that intensity yourself. Caffeine raises epinephrine modestly and 'probably' helps a little.

EXAMPLES

1. Learning neuroanatomy
Huberman studied by mentally tracing pathways through the brain until he hit the point where he didn't know what came next, then looking it up. Guessing 'fimbria' and being wrong is why he'll never forget the habenula, now known to be involved in disappointment and depression.

2. Gap effects
Pausing for 5–30 seconds during learning lets hippocampal neurons replay new information about 20–30 times faster than normal, as they do in REM sleep. Huberman does this in the episode itself, along with quizzing listeners on the three mechanisms of plasticity.

3. A medieval cold-water practice
In a review by memory researcher James McGaugh, people were described being thrown into cold water after learning

something, to release adrenaline and consolidate the memory. Huberman says a cold shower while mentally reviewing material is an option, using safe practice.

4. Interleaving

Related but non-central anecdotes, like Huberman's bulldog or the Olympics, act as breaks and seem to enhance learning compared with an uninterrupted fire hose of material.

5. Watch one, do one, teach one

This saying from Huberman's training labs fits the finding that top students teach their peers. Teaching is itself a test of mastery.

OTHER RELEVANT

1. From skill to virtuosity

Huberman distinguishes being unskilled, skilled, having mastery (full depth used flexibly) and virtuosity, where great musicians and athletes deliberately invite uncertainty into what they've mastered.

2. Treat errors as useful

Getting answers wrong, then learning the correct ones, signals the nervous system that it needs to learn the material.

3. A simple routine

Schedule focused blocks without your phone, self-test right afterwards, protect that night's sleep, and add NSDR.

Tools for Nutrition & Fitness | Dr. Layne Norton

Guest: Dr. Layne Norton
Date: 2024-08-12 · Duration: 4:04:30
URL: https://www.youtube.com/watch?v=CD0bRU1e1ZM

KEYPOINTS

1. Judge claims by the full body of evidence, not a mechanism or a single study
Norton, trained in biochemistry and nutritional sciences, says he doesn't make big shifts in his opinions based on single studies. He wants many experiments from different labs, funders and countries pointing the same way, and creatine is his model of that. Study design explains many 'conflicting' results: a rice-versus-whey study found equal protein synthesis because it used 40 g, enough to max out the response with either source. Even randomized trials have limits. A one-year diet trial in 60-year-olds can't capture LDL, which Mendelian randomization shows acts as a lifetime exposure.

2. Muscle protein synthesis switches off after a meal even if amino acids stay high
In his rat studies, protein synthesis peaked about 90 minutes after a meal and was back to baseline by 3 hours, even though leucine and mTOR signaling were still elevated, an effect others call 'muscle full.' A roughly 2001 study infusing amino acids for six hours saw the same rise and fall. The only explanation his lab found was falling ATP inside muscle cells, since building protein is energetically expensive; he notes others may disagree.

3. Total daily protein matters far more than timing
Norton's rule of thumb is about 1 g of protein per pound of body weight (studies suggest about 1.6 g/kg maxes out the response on average, but he suspects some people benefit from more). Jorn Trommelen's recent study found that 100 g of protein after training was used far more than the old '30 g per meal' ceiling suggests. In Grant Tinsley's time-restricted eating trials, people who ate three high-protein meals in an 8-hour window and trained during it gained as much lean mass as those eating across the day.

4. Early versus late eating windows make little practical difference
In a recent 12-week trial with all food provided and matched calories and protein, eating 80% of calories before 1 p.m. in an 8-hour window was compared with a 12-hour window weighted after 5 p.m. The groups differed only in fasting glucose, not HbA1c. Norton reads that as a transient effect of a longer overnight fast, since HbA1c reflects glucose exposure over the whole day.

5. Get close to failure for size; mostly avoid failure for strength
Citing meta-regressions by his powerlifting coach Zac Robinson, Norton says hypertrophy needs sets taken close to failure (defined as no longer able to complete a rep in good form), but not necessarily to failure. For maximal strength, regularly reaching failure is probably counterproductive. Occasional sets to failure teach you where your true limit is.

6. Almost any training style builds muscle if you work hard and stay consistent
Machines or free weights, roughly 5 to 30 reps, to failure or a few reps short: all build similar muscle if the last reps are hard and volume is adequate (about 10–20 hard sets per muscle per week is the range discussed). Older lifters gain a similar percentage of lean mass as younger ones, and women a similar percentage as men. He estimates three or four 30–40 minute sessions a week capture most of the health benefit.

7. Metabolism barely slows with age; muscle loss and moving less do
Discussing Herman Pontzer's data on several thousand people, Norton notes that total daily energy expenditure stays fairly flat through most of adulthood and declines only later in life, and the decline tracks the loss of lean mass. That makes resistance training the lever. Poor sleep cuts spontaneous movement without people noticing.

8. GLP-1 drugs work on appetite, which is where obesity lives
Norton describes GLP-1 drugs as modified gut hormones with much longer half-lives. Raising GLP-1 naturally is a 'BB gun' compared with the drugs' 'tank.' Users often report the end of constant 'food noise.' Lean tissue makes up 30–40% of the weight lost, which he notes is similar to dieting without exercise. He expects resistance training and prioritizing protein and fiber to protect lean mass.

EXAMPLES

1. Saturated fat versus fructose in liver fat
He cites an overfeeding study in which matched excess saturated fat raised liver fat about 70% more than fructose did. On seed oils, he has not found a good human randomized trial in which swapping polyunsaturated fat for saturated fat one-for-one worsened outcomes. Both polyunsaturated and monounsaturated fats look better than saturated fat for cardiovascular risk, and he knows of nothing bad about olive oil.

2. Red meat as a marker of overall diet quality
In a 2020 Canadian analysis he recalls (Maximova), higher red meat intake was linked to more cancer only when fruit and vegetable intake was low. That suggests red meat partly tracks poor overall diet quality. Fiber and produce, by contrast, consistently show dose-dependent drops in cancer, heart disease and mortality.

3. Fructose and glycogen refilling
Muscles can't turn fructose into glycogen, but in a study by Tracy and Josh Anthony, sucrose refilled muscle glycogen after exercise as well as or slightly better than pure glucose. The fructose probably satisfies the liver and spares glucose for muscle, so fruit in a post-workout shake is fine.

4. Collagen versus whey
A study from Luc van Loon's lab found whey and collagen raised connective-tissue synthesis equally after exercise, but

collagen didn't stimulate muscle protein synthesis even at about 25 g. Norton calls collagen a poor protein for muscle. After reviewing the composition of collagen, which is about one-third glycine, and meta-analyses on skin, he has become slightly more open to possible benefits.

OTHER RELEVANT

1. Use artificial sweeteners as a tool, not a fear

Norton sees swapping five regular colas for diet ones (about 750 kcal a day) as an easy win for weight loss. Gut microbiome shifts from sucralose are real, but researchers can't yet say whether they are good or bad. He wants a dose-response before treating a cancer signal as real. Huberman notes that diet soda sometimes makes him want to eat.

2. Keep saturated fat moderate and favor the plan you can sustain

He suggests keeping saturated fat below about 7–10% of daily calories. Because 'there are no solutions, only trade-offs,' he would accept a slight LDL rise for someone who lost 50 lb on the only diet they could stick to. Even 5% weight loss quickly improves blood lipids and glucose.

3. Plan around real life for consistency

He eats about four meals a day with roughly 50 g of protein each, about 235 g in total. He tracks food and will cycle calories, for example budgeting 4,000 kcal for a Saturday with friends and less on other days, purely so he can stick with the plan. Whey and eggs are among the most leucine-rich proteins; most plant proteins have less.

AMA #18: Cold Therapy Advice, Skin Health Tips, Motivation, Learning Strategies & More

Date: 2024-08-02 · Duration: 0:56:44
URL: https://www.youtube.com/watch?v=Gf-kC30SLtc

KEYPOINTS

1. Thinning skin with age reflects weakened collagen and elastin plus moisture loss
Answering a 77-year-old listener, Huberman says excess sun categorically ages skin faster. You don't need to burn to raise your skin cancer risk, yet some sun is still needed for vitamin D, circadian rhythm and hormones; just avoid peak UV hours. His tiers run from zero-cost (sun protection, moisturizer) to moderate (collagen, red light) to prescription and procedures.

2. Mineral sunscreens are the least controversial choice
Physical barriers (hat, long sleeves) are undisputed but leave the ears, neck and parts of the face exposed. Zinc oxide and/or titanium dioxide up to about 25% are widely considered safe; if titanium dioxide worries you, use pure zinc oxide, at the cost of a pastier feel. Chemical filters like oxybenzone can reach the bloodstream with heavy use and may be endocrine disruptors. Huberman's stance: occasional use beats no protection, but for frequent all-summer use, choose mineral.

3. Ingesting collagen has moderate evidence for skin elasticity
Studies use 5–30 g a day (most often 15–30 g), often with vitamin C to aid absorption or utilization, and report statistically significant but not dramatic gains in elasticity, smoothness and plumpness. Sources include bone broth and fish or animal powders; plant-based versions are less clear.

4. Red and near-infrared light panels also show moderate benefits
Protocols run about 10–15 minutes a day, at least 5 days a week for a few months. Combining light with collagen might be synergistic, but that hasn't been tested. Retinoids, a dermatologist-supervised prescription option that increases sun sensitivity, are among the best-supported ways to improve collagen.

5. Cold should be uncomfortable enough to make you want out, yet safe to stay in
No systematic study defines the ideal time and temperature. Huberman works in 'walls': getting in, then rapid breathing, with clear thinking returning after about 20 seconds when hands and feet start to hurt. He suggests 1–3 minutes for most people, or 30 seconds if mental resistance is high. A gauge: put your hand in and rate your eagerness from 1 to 10; a 5 or 6 is about right. Novices might start around 55–60°F; he typically uses 45–50°F.

6. Never do breathwork before getting into cold water
Hyperventilating blows off CO2 and blunts the gasp reflex. People who did cyclic hyperventilation before going into water have blacked out and died. Ideally have someone watching who isn't in the water. Calm breathing while in is fine, but don't emphasize exhales and never deliberately submerge.

7. Cold after lifting may blunt gains in some settings, but don't be paranoid
Huberman says cold immersion right after resistance training can limit some strength and hypertrophy adaptations, but there is 'zero evidence' a cold shower after lifting does. His overall advice is to be neither too paranoid nor too obsessive about cold.

8. REM sleep supports learning and strips emotional load from memories
REM is concentrated toward morning, has more vivid, emotional dreams, and occurs with adrenaline essentially unavailable and the body paralyzed (atonia), making it a form of nightly trauma therapy. The first night after learning something matters most. Alcohol and late caffeine disrupt REM, and no drug clearly and specifically increases it.

9. Brief pauses during learning trigger 20–30x speed replay
Papers on music, math, concept and motor learning show that random ~10-second 'micro gaps' let the hippocampus and neocortex replay the material (sometimes in reverse) at 20–30 times normal speed, adding repetitions for free. This mirrors replay during REM sleep. Huberman suggests one to five, or even up to 10, gaps per hour, without phones or reviewing the material during them.

10. Shilajit sits low on Huberman's testosterone list
Shilajit is a Himalayan mineral pitch with many fakes. Studies summarized on Examine include one with 60 participants showing a small testosterone increase, small FSH increases and a slight sperm-quality gain. Because it may raise FSH, he cautions it could disrupt menstrual cycles. Fixing body fat (neither too high nor too low), sleep and training does far more; he says even a 20-minute increase in REM sleep would beat shilajit for testosterone.

EXAMPLES

1. Wendy Suzuki's meditation study
Her NYU lab found about 13 minutes a day of brief meditation improved working memory, other memory, focus and stress. Huberman would start every class with 3–5 minutes of focused 'third eye' meditation, framed as a perceptual exercise of shifting from exteroception to interoception, not mysticism.

2. The $1,000 phone bet
When writing grants in his San Diego lab, Huberman handed over his phone and promised each lab member $1,000 (money he didn't have) if he asked for it back before 5 pm. He also suggests writing a check you can't afford to lose.

3. Self-contracts for his book
Rather than announcing goals, which he says invites premature support that saps drive, he signs a personal contract after each 10–60 minute writing block. He doesn't let himself leave his seat until the timer ends, and after 20–30 minutes he no longer wants to.

4. Sauna practice

Being heat tolerant, he sets a traditional (not infrared) sauna to about 210°F for 10–20 minutes maximum and alternates with the cold plunge. He stresses it doesn't take much to overheat the brain.

OTHER RELEVANT

1. Ways to get more REM

Add 10–30 minutes of sleep in the morning, even via the snooze button. Get an early-day adrenaline surge from morning exercise or a cold shower. Do a 10–20 minute NSDR protocol on waking; he and Matt Walker plan to test whether NSDR mimics REM. Trust REM rebound the next night if you avoid late caffeine and alcohol.

2. What schools could do

Prioritize sleep (later starts, no phones at night), open lessons with brief meditation, insert micro gaps, and schedule physical activity right before learning; catecholamines from exercise aid encoding. Teach students their attention thresholds and watch post-lunch slumps.

3. Start a routine as a closed loop

Write the goal on paper, check off each completion and make the effort itself the reward, drawing on Carol Dweck's and David Yeager's growth-mindset work. Use fear-setting or a cold shower for extra activation, and put your phone in another room or a box.

4. Addiction resources

Huberman points to free 12-step communities, which a Stanford psychiatry study found can be very useful, and to his episode with Dr. Anna Lembke, author of 'Dopamine Nation'. He defines addiction as a progressive narrowing of what brings you pleasure.

Supplements for Longevity & Their Efficacy | Dr. Peter Attia

Guest: Dr. Peter Attia
Date: 2024-07-29 · Duration: 2:30:41
URL: https://www.youtube.com/watch?v=79p1X_7rAMo

KEYPOINTS

1. Living longer today means delaying chronic disease
Attia notes that a century or more ago, living longer meant surviving childbirth, infection and trauma. Now it is mathematically equivalent to delaying cardiovascular, cerebrovascular, metabolic and neurodegenerative disease and cancer. He sorts tools into three groups: unavoidable behaviors done well or badly (eating, sleeping, moving); drugs that target specific diseases (statins, PCSK9 inhibitors, bempedoic acid, SGLT2 inhibitors, GLP-1 agonists, metformin); and 'geroprotective' molecules aimed at hallmarks of aging.

2. Attia takes rapamycin as his one purely geroprotective drug
He takes 8 mg once a week, pausing when he gets painful mouth ulcers (aphthous ulcers), which hit about 10% of users and are 'paradoxically the only biomarker' that it's working. Generic rapamycin costs about $5 per mg, roughly $40 a week. He also takes a PCSK9 inhibitor, bempedoic acid and an SGLT2 inhibitor, which he considers probably broadly geroprotective too.

3. Weekly pulsing changed his view of rapamycin's immune effects
Daily rapamycin is an immunosuppressant, approved in 1999 for transplant patients. A 2014 study by Joan Mannick and Lloyd Klickstein gave 65-year-olds the related drug everolimus on intermittent schedules and found better responses to flu vaccine. For Attia, that marked the shift from 'cool in mice' (the 2009 ITP result) to 'maybe we should take this', since the drug appears to modulate immunity in either direction.

4. The Interventions Testing Program is the strictest test of longevity molecules
The ITP tests compounds in genetically diverse (non-inbred) mice in triplicate at three institutions; of more than 50 molecules, very few extend life. Rapamycin worked even when started at about 21 months, roughly a 60-year-old human equivalent. Canagliflozin (an SGLT2 inhibitor), acarbose and 17-alpha estradiol also worked. Resveratrol did 'categorically nothing'.

5. Glucose control may matter independent of weight
Acarbose, which blocks glucose absorption in the gut, and canagliflozin, which makes you excrete glucose in urine, both extended mouse lifespan without lowering body weight. Attia reads this as evidence that tight glycemic control itself has longevity value.

6. NR failed the ITP at mega-doses
Nicotinamide riboside, an NAD precursor, was tested at roughly 500–1,000 mg per kg of body weight and produced no change in lifespan or healthspan. Mouse-equivalent doses for a 100-kg person would cost about $300 a day. Huberman says NR crosses cell membranes readily, while NMN's phosphate group is cleaved in the gut, which may favour NR at 300–600 mg over NMN at about 1,500 mg.

7. Human NR trials show statistical blips, not clinical benefit
In a roughly 100-person fatty-liver trial (MRI liver fat; above 5% counts as fatty liver), neither dose changed liver fat, weight, inflammation or glucose. Only a subgroup analysis (people under 27% liver fat) showed the lower dose dropping from 20% to 15%, while the higher dose did nothing. Attia warns never to confuse statistical with clinical significance, comparing it to lowering blood pressure from 160/100 to 157/97.

8. One intriguing signal: non-melanoma skin cancer
Attia found one study (NR or NMN — he considers them roughly equivalent) reporting 60–80% fewer basal and squamous cell carcinomas, with no effect on melanoma. He'd like to see it replicated. It might matter for people with heavy sun exposure, and he notes skin shows the largest age-related NAD decline.

9. Biological-age tests are mostly noise for now
Clocks that combine glucose, vitamin D and methylation markers are too variable to tell whether you measured the same 'state' a year apart. Attia says that, last he checked, companies weren't truly sequencing the epigenome base by base, just averaging methylation. He thinks the epigenetic piece may prove useful eventually.

EXAMPLES

1. The resveratrol mouse that couldn't breathe
The one positive resveratrol result used mice fed so much fat that their livers pushed into the chest cavity. Mega-doses rescued them, but humans would need to drink about their body weight in wine daily, which debunks the 'French paradox' explanation. The ITP's version found nothing.

2. Huberman's NAD infusion
He found an IV NAD drip (500 mg over roughly 30 minutes to 3 hours, often combined with glutathione and vitamin C) intensely unpleasant during the infusion, then felt good afterward. He felt similarly after plain saline drips. Sublingual NMN, 1,500 mg in the morning, makes his hair and nails grow fast. He takes it inconsistently.

3. Attia's over-the-counter list
Fish oil (EPA and DHA) in capsules for better compliance, thiamine (some evidence in mild cognitive impairment), vitamin D 5,000 IU (raises him from about 30 to 50 ng/mL), methylfolate and methyl-B12 to lower homocysteine (no B6, given nerve-damage risk), magnesium in three forms, ashwagandha for sleep, 5 g creatine, and Akkermansia-based probiotics.

4. Huberman's core list

Over 1 g of EPA a day from liquid fish oil, about 5,000 IU of D3 (adjusted by blood tests), methyl-B12, Tongkat Ali (which lowered his SHBG), green tea capsules, 10 g of creatine, and magnesium threonate, apigenin (50 mg) and sometimes inositol (900 mg) before sleep. He dropped nicotine gum because it felt too stimulating and had become a habit.

OTHER RELEVANT

1. The Titanic analogy

Attia's framing: exercise, sleep, nutrition and emotional health decide the Titanic's heading relative to the iceberg. Supplements are whether the dining room served lobster or steak. Both agree those four pillars dominate.

2. Don't take NAD-pathway supplements for longevity

Asked directly, both said no. Attia, citing an idea along the lines of 'show me your portfolio', says he passionately doesn't believe they do anything, so he takes none, but will change his mind if new data appear.

3. Experiment with exercise timing for energy

Huberman finds that finishing his workout before 9 a.m. gives him more energy all day than a late-morning session, and hypothesizes body-temperature rhythms are involved (untested). Track how timing affects your energy.

Build a Strong, Pain-Proof Back | Dr. Stuart McGill

Guest: Dr. Stuart McGill
Date: 2024-07-15 · Duration: 2:52:15
URL: https://www.youtube.com/watch?v=mAlt_HKX4as

KEYPOINTS

1. Back pain is a symptom, not a diagnosis
McGill compares asking for 'an exercise for back pain' to asking for one for leg pain: there are a hundred or more pathways that produce it. His summary is that genetics loads the gun, exposure pulls the trigger, and the psychosocial setting shapes how a person responds. So the starting point is always an assessment, not a generic routine.

2. Skeleton shape decides which loads a spine tolerates
A thin, willowy spine handles repeated bending but not heavy compression; a thick spine bears huge compression but tolerates little bending. The man with the world record for consecutive sit-ups has a slender spine. Knee width and the width across the iliac crests are rough surrogates for how heavy a skeleton is. Disc shape varies too: golfers tend to have ovoid discs, while people who carry big compressive loads have bean-shaped 'limacon' discs.

3. Discs are layered collagen, and the 'glue' between layers is partly inherited
A disc is about 80% type 1 (stiff) collagen and roughly 20% more elastic collagen, held together by binding collagens (types 3–10) where genetic variation is large. Repeated bending reversals can delaminate those layers, so how many flexion cycles someone tolerates is partly set by their parents. Discs evolved because a stack of ball-and-socket joints would be impossible to control; a disc's built-in stiffness acts like a shock absorber.

4. Facet angles and spacing make the same technique safe for one person and harmful for another
Open facet joints let pro golfers rotate; arching hard can stress the pars bone and cause the spondylolisthesis fractures seen in gymnasts and in a pro tennis player McGill rehabbed after a coach pushed extra extension into the serve. A big-arch bench press suits people with wide gaps between the spinous processes; others crush the interspinous ligaments copying it.

5. Every tissue needs stress, but crossing the tipping point builds cumulative damage
McGill's core principle: cardiovascular, musculoskeletal, endocrine and psychological systems all need stress to adapt, but beyond a personal tipping point you accumulate trauma. The job is to find that point, expand it slowly, and stay under it, which often means controlling volume and adding deloads rather than banning an exercise.

6. Assessment works by deliberately provoking the pain
He starts with the person's story and goals, then pain behaviour (morning, sitting, walking, does it travel down the leg). Provocative tests follow: if he can reproduce the pain, he has found the mechanism; if he can't, it isn't mechanical. Example: pulling up on the chair seat while sitting adds compression; if that sends pain down the leg, the person has compression intolerance and needs non-compressive exercise. Nerve flossing (extend the leg while looking up) helps tell nerve friction from nerve tension.

7. Injury is asymmetric, so protect joints over chasing muscle
Citing Nassim Taleb's Antifragile (which cites McGill's low-back disorders book), he argues a 50% loss hurts more than a 50% gain helps. Muscle is adaptive and resilient; joints are much less so. Training hard in youth for muscle can leave people at 70–80 unable to kneel.

8. Some pain is a rewired brain, not damaged tissue
In line with Sean Mackey's biopsychosocial model, McGill describes patients carrying trauma, such as surviving a crash in which a parent died, or past abuse, whose reactions to physical testing don't fit. More fitness won't break through; instead he finds movements that don't trigger pain, even a feather brushed over the back, and slowly expands that pain-free repertoire.

9. McGill's Big 3 build stiffness while sparing the spine
The bird dog, curl-up and side plank weren't his invention, but his lab measured spine stability quantitatively and found these the most efficient way to build it with low spine load. Proximal stiffness sends force out to the limbs: the pec major pulls on the rib cage as well as the arm, so a braced core turns more of that effort into the push. He does the Big 3 six days a week. He wouldn't name a universal fourth exercise; it depends on the assessment.

10. Disc height loss with age can't be reversed
Inversion or anti-gravity boots raise disc height for about 15 minutes before hydrostatic pressure pushes the fluid back out. He has seen no evidence that PRP restores discs, though he 'swears by' it for stubborn muscle tears and sometimes for ball-and-socket joints. After a disc injury the goal becomes management: people can usually keep mobility or keep heavy strength, not both.

EXAMPLES

1. Virtual surgery: 95% glad at two years
For patients who had failed every therapy and been told surgery was their last option, McGill 'anoints' them and prescribes a full post-surgical recovery: bed rest with short shuffles, then stability, mobility, endurance and only later strength. In his clinic's follow-ups, 95% of those who avoided surgery this way were glad they had. His view is that surgery often works because it forces rest.

2. Triathletes show the trade-offs
The fastest swimmer rarely wins: swimming rewards floppy ankles and long torsos, cycling rewards a stiffened core like a stiff bike frame, and elite running rewards tuned elastic 'springs' (he recommends Shane Benzie's The Lost Art of Running). Golfers who hit 330 yards are elastic athletes who don't test as very strong.

3. Pensacola firefighters
Two groups trained: one with coaches who explained good form, one with rep-pushing 'cheerleader' trainers. Both got fitter, but the cheerleader group showed more injury markers, such as knee valgus collapse, on fire-ground tasks they had never practised. McGill also cites Bill Marras's data showing about 10 times the disc-injury risk in workers who bend through the spine under load.

4. Pro golfers who took up heavy lifting
When some pros adopted Olympic lifts and heavy deadlifts, none he knows hit the ball farther, and several developed sore knees and disc bulges; those who backed off have less pain. Deadlift injuries often follow rushed progressions, such as trainers taking novices to twice bodyweight in six months when bone takes much longer to adapt.

5. Huberman's L3–L4 bulge
Doing the Big 3 eased Huberman's occasional right-side low-back pain and helped him run upright. McGill notes the Cobra can vacuum some disc bulges back in but worsens others, and that a lumbar pad, or a rolled towel, helps on flights and in restaurant booths.

OTHER RELEVANT

1. Dose walking instead of doing one long walk
If your tipping point is 40 minutes, a 40-minute walk guarantees pain; three 20-minute walks give a pain-free hour. People with discogenic pain should keep changing posture, for example roughly 20 minutes sitting, 30 standing and 10 walking at a sit-stand desk.

2. Try the 'biblical training week'
Six days on, one day off: two strength days (squat, lift, lunge, push and pull patterns plus some bodybuilding), two mobility days for stiff or injured areas, two cardio days. Never repeat the same type two days running. McGill, 67 and pain-free with a replaced hip, uses wood-splitting, kayaking, cycling, cross-country skiing and snow shovelling.

3. Build pain-free capacity before you flirt with pain
Rebuild a margin of pain-free training first, then expand volume toward your goal. Older trainees recover from flare-ups more slowly, so they have less reason to push.

4. Pick tools for your goal, not the trend
Deadlifts are one option for bone density or grinding strength, but McGill would usually start with hip-hinge training and choose based on hip socket depth and history. Belt squats or machine work can load the legs without compressing the spine. Loading the hands and feet (Indian clubs, heavy hands) also fits his view that the extremities need training.

How to Improve Skin Health & Appearance

Date: 2024-07-01 · Duration: 2:27:55
URL: https://www.youtube.com/watch?v=1CxJVdeyltw

KEYPOINTS

1. UV light damages the outer skin, while red light reaches deeper
Short-wavelength UV mostly hits the epidermis, where it can mutate DNA, disrupt collagen and elastin in the dermis below, and raise skin-cancer risk. Long-wavelength red and near-infrared light penetrates deeper. That difference is why Huberman treats UV as something to manage by dose, while red light shows up later as a possible therapy.

2. Some sun is good for you; excess sun ages skin
Every dermatologist Huberman consulted agreed on both points. Skin is an endocrine organ involved in vitamin D, testosterone and estrogen pathways, so some sun exposure is beneficial, while too much accelerates visible aging and raises cancer risk. He notes that some of the deadliest skin cancers arise independently of sun exposure.

3. Physical barriers are the least controversial protection
Hats, shirts and jackets block sun without any chemical debate. How much protection you need depends on your skin pigmentation, where you live, the season and what you're doing outdoors. Huberman places himself between the extremes of 'sunscreen truther' and 'beekeeper'.

4. Mineral sunscreens reflect UV; chemical sunscreens absorb it
Mineral ('inorganic') sunscreens use zinc oxide and/or titanium dioxide and are generally considered safe at up to 25% concentration. Chemical ('organic') sunscreens use compounds like oxybenzone and avobenzone, some of which raise endocrine-disruption concerns. Huberman notes those concerns come mainly from studies using very high application amounts.

5. No chemical sunscreen for babies under 6 months
Infant skin absorbs substances almost like mucosal tissue. Huberman personally avoids chemical sunscreens. If titanium dioxide worries you (suggestive evidence only, mainly about nano-sized particles crossing the skin), choose a zinc-oxide-only formula. Titanium dioxide is often added mainly to make zinc less pasty.

6. Sunscreen doesn't block your vitamin D
Dermatologists told Huberman that sun exposure still supports vitamin D even with sunscreen or clothing, because longer wavelengths get through. If you supplement, he suggests starting low, around 1,000–3,000 IU (up to 5,000), and testing your levels; even people who get a lot of sun can be low.

7. Oral collagen is a surprising exception to 'no targeted nutrients'
Eating liver doesn't specifically feed your liver, yet meta-analyses show that 5–15 g a day of hydrolyzed collagen, especially with vitamin C, can measurably improve elasticity and wrinkles. Dermatologists suggested 15–30 g a day of collagen peptides with 500–1,000 mg vitamin C, or food sources such as bone broth. The proposed mechanism is that di- and tripeptides increase fibroblast activity.

8. Niacinamide supports moisture, inflammation, pores and dark spots
Dermatologists recommended 500 mg twice a day of this vitamin B3 form, which boosts ceramides (skin lipids that hold moisture), reduces inflammation, balances oil and can lighten hyperpigmented spots. Effects take 3–6 months. Topical versions need about 2–10% niacinamide, often paired with hyaluronic acid as a humectant (it holds moisture in).

9. Retinoids are the dermatologists' top pick, with real cautions
Tretinoin (Retin-A) and related vitamin-A derivatives act through retinoic acid on gene expression, building collagen and new skin. Dermatologists were 'bullish' about starting in your 20s and reported 'remarkable results'. They must be avoided in pregnancy or breastfeeding because of fetal-development risk, and they increase light sensitivity, redness and dryness. Over-the-counter retinoid esters are popular but less studied.

10. BPC-157 and copper peptides: plausible mechanism, little human evidence
BPC-157 increases blood-vessel growth and wound healing in animals, but Huberman knows of only one weak human study. It's unclear whether it crosses the skin, and growing new vessels throughout the body could also feed undetected tumors. Copper supports DNA repair and acts as an antioxidant, but too much triggers inflammation, so aim for adequate dietary levels rather than extra supplements.

11. Insulin spikes fuel acne through mTOR and androgens
High-glycemic-load eating raises insulin and glucose, activating the mTOR growth pathway, which increases androgen signaling, sebum (skin oil) and the cells that clog pores. Processed, high-heat foods add inflammatory advanced glycation end products (AGEs). Huberman says the teenage myth is true: fried food can make skin worse.

EXAMPLES

1. Swedish study: sun avoiders lived 0.6–2.1 years less
In the Melanoma in Southern Sweden cohort, non-smokers who avoided sun had a life expectancy similar to smokers in the highest sun-exposure group. Huberman cautions against reading this as 'sun extends life': people who get more sun also exercise more and feel better, and longer lives also mean more cancers, including melanoma.

2. Low-fat dairy may worsen acne more than full-fat
A nutrition-minded dermatologist told Huberman that emulsifiers in non-fat and low-fat dairy can spike insulin more than full-fat dairy, so switching to skim sometimes makes acne worse. Heavy whey intake may also contribute; Huberman suggests running a personal experiment rather than cutting it automatically.

3. Red/near-infrared light protocol
Huberman cites a 2018 systematic review of randomized trials of LEDs in dermatology. The approach he and a dermatologist converged on was high-intensity red plus near-infrared light from 1–2 feet away, for 10–15 minutes, 5–7 days a week. Effects on skin appearance, acne and wound healing are mild to moderate, and many studies found no significant effect.

4. Popping pimples causes permanent scars
Squeezing releases matrix metalloproteinases, enzymes that eat into the extracellular matrix and leave indentation scars. Dermatologists 'practically begged' Huberman to pass this on. Leave the pimple alone, use a little corticosteroid cream for redness, or get a steroid injection before a major event.

5. Cutting alcohol often resolves rosacea
Many people with rosacea who stop drinking see it disappear or improve dramatically, whether through direct blood-vessel dilation or through effects on sleep and the gut. Spicy foods, heat and harsh astringents also aggravate it.

OTHER RELEVANT

1. Gentle daily skin care
Cleanse two to three times a day, not more, with a gentle unscented cleanser (Huberman uses unscented Dove bar soap) and lukewarm water. Apply salicylic acid only to clean skin, and only if recommended. Shower soon after the gym. Over-cleansing strips the skin's microbiome.

2. Eat for low inflammation
Aim for 75–100% minimally processed food. Include omega-3s (walnuts, flax, fatty fish or liquid fish oil), leafy greens, colorful produce, garlic and bone broth, plus 1–4 servings a day of refrigerated, low-sugar fermented foods. Get vitamin A from food, not supplements, because it's easy to overdose.

3. Lifestyle levers that show on your face
Consistent sleep, minimal alcohol, good hydration with electrolytes, and no smoking, vaping or nicotine (a vasoconstrictor). Managing stress with physiological sighs or 10–20 minutes of NSDR helps, because chronic adrenaline reduces blood flow to the skin.

4. Rosacea basics
Use a mineral SPF 30 sunscreen, a gentle moisturizer and possibly niacinamide or licorice root. Stubborn cases may come from over-cleansing, and visible vessels can be treated with pulsed dye laser. Get your whole skin, not just moles, checked once a year.

How to Exercise & Eat for Optimal Health & Longevity | Dr. Gabrielle Lyon

Guest: Dr. Gabrielle Lyon
Date: 2024-06-24 · Duration: 3:03:37
URL: https://www.youtube.com/watch?v=WFcYF_pxLgA

KEYPOINTS

1. Skeletal muscle is 'the organ of longevity'
Lyon describes muscle as an endocrine and nutrient-sensing organ responsible for roughly 80% of glucose disposal. It is also the body's amino acid reservoir and 'body armor'. She argues that type 2 diabetes, obesity and cardiovascular disease often begin in muscle decades earlier. At rest, muscle is not very metabolically active, burning about 10 calories per pound and mainly using fatty acids.

2. The problem is often being under-muscled, not overfat
During her geriatrics fellowship, a yo-yo-dieting patient who followed a low-fat, high-carb diet and exercised had brain imaging resembling early Alzheimer's. Lyon concluded that the problem was too little muscle, not too much fat. She notes that no one knows the optimal amount of muscle, that DEXA only estimates lean tissue, and that sarcopenia was not classified as a disease until 2016.

3. Muscle quality matters as well as size
Inactive muscle can become fat-infiltrated 'like a marbled steak', impairing contraction and mitochondria. She compares an inactive, overfed person's muscle to a suitcase packed for 30 days on a four-day trip: glycogen-filled muscle has nowhere to put new fuel, so glucose, insulin, free fatty acids and branched-chain amino acids rise in the blood. High triglycerides, insulin or glucose on bloodwork are her clues to unhealthy muscle.

4. Earn your carbohydrates through activity
The liver stores about 100 g of glycogen and muscle perhaps 400–500 g. Lyon cites 130 g a day as the recommendation for sedentary people (largely for the brain), versus an average US intake of about 300 g. Outside exercise she suggests capping meals at 40–50 g of carbs, and allowing roughly 40–70 g more per hour of exercise depending on intensity. For people who are overweight or have type 2 diabetes she says there is evidence for going lower.

5. Make the first meal 30–50 g of high-quality protein
About 2.5 g of leucine, roughly 30 g of quality protein, triggers muscle protein synthesis, which lasts about 2–3 hours. Lyon says meal timing matters little for young, healthy people, but in your 60s and beyond, prolonged fasting may harm muscle. A protein-rich first meal also releases satiety peptides like GLP-1; she cites Heather Leidy's work showing adolescents given 30–40 g of protein were less likely to choose foods like donuts later.

6. Protein quality depends on the amino acid profile
Animal proteins such as eggs, whey, beef and poultry closely match human muscle's amino acid needs. Plant proteins can work if the total is high enough: Lyon suggests about 1.6 g/kg for plant-based eaters and a rice–pea blend, noting that six cups of quinoa roughly equal one small chicken breast in amino acids. She advises against adding leucine alone, because leucine, isoleucine and valine work together, but says essential amino acids can top up a low-protein meal.

7. The protein RDA is a minimum, not an optimum
The RDA of 0.8 g/kg (about 0.37 g per pound), set in the 1980s from nitrogen balance studies, would give a 115-pound woman about 45 g a day. Lyon recommends about 1 g per pound of ideal body weight. In her view, evidence does not show such intakes harm the kidneys or bones; obesity is a major cancer risk factor, and protein-forward diets improve body composition. These are her positions on a topic she acknowledges is contentious.

8. Older muscle needs more protein to respond, and becomes 'anabolic resistant'
Children respond to 5–15 g of protein, while older adults show little response unless a meal contains 30–50 g. Lyon notes that about 40% of women over 60 eat below the RDA, forcing the body to draw amino acids from existing muscle. On mTOR, she argues muscle activates it through contraction-specific pathways, and that fearing protein for cancer reasons is as 'myopic' as fearing resistance training. She cautions against loading protein while staying sedentary.

9. Prioritize hypertrophy with 'high ground' movements
Borrowing Pat Davidson's idea, Lyon recommends machine exercises with full support for unskilled lifters, such as hack squats, leg presses, leg extensions and curls, supported rows and lat pulldowns. She aims for sets where the final reps are hard (for example 5–10 reps, 4–5 sets), noting McMaster data that light weights work if the stimulus is sufficient. Walking alone will not preserve type II fibers, and tendon injuries are what 'take people out' in their 40s.

EXAMPLES

1. Layman's 12-month study of 130 people
In Don Layman's lab, overweight adults ate the same calories, 500 below maintenance, as either a food-pyramid diet (protein about 10/15/45 g at breakfast, lunch and dinner) or a 40/30/30 diet with protein spread evenly (about 45/35/35 g). The protein group lost about 24% more weight, 16 versus 11 pounds of fat, and lost less lean mass.

2. Protein plus simple exercise in 48 women
In a 16-week study of women averaging age 46 with a BMI of 33, the group eating 1.6 g/kg of protein and doing 30-minute walks five days a week plus two bodyweight sessions lost 46% more weight and 60% more fat than the low-protein exercise group, with 40% less lean mass loss.

3. Lyon's own training
At about 110 pounds, she trains whole-body three days a week, with a day between sessions, covering push, pull, hinge and

squat after a heavy sled push. She says she dreads every Monday session but never skips.

4. GLP-1 drugs

Lyon says semaglutide (about 13% weight loss over 24 weeks) and tirzepatide (up to about 22%) are the most effective tools short of bariatric surgery. In her clinic, with proper nutrition and resistance training, she does not see muscle loss. She notes possible pancreatitis risk and a rodent thyroid-cancer signal that she thinks may not apply to humans.

5. Lab quirks in strong people

Patients with lots of muscle often show high creatinine; she checks cystatin C to correct GFR. Hard training can transiently raise ALT and liver enzymes.

OTHER RELEVANT

1. Time protein around training if older or eating low protein

Young people eating about 1 g per pound need not worry about timing. Older people, or those eating less protein, may benefit from a shake within about an hour of resistance training.

2. Supplements Lyon uses

Creatine has benefits, especially for postmenopausal and older people; Lyon says about 5 g affects muscle and about 12 g may affect the brain, while a pound of steak has only about 2 g. She also takes 500–1,000 mg of urolithin A (citing human trials on strength and endurance), plus whey protein and collagen.

3. Set standards, not goals, and know your vulnerability points

Lyon says goals come and go but standards for how you operate remain. Predictable lapses come at peaks and right after big successes, when dopamine dips below baseline, and on Friday nights. She also stresses emotional neutrality.

The Science of Hunger & Medications to Combat Obesity | Dr. Zachary Knight

Guest: Dr. Zachary Knight
Date: 2024-06-17 · Duration: 2:18:56
URL: https://www.youtube.com/watch?v=C5KpIXjpzdY

KEYPOINTS

1. Two systems control eating: a brainstem meal-ender and a hypothalamic fat tracker
Knight, a UCSF neuroscientist, points to Harvey Grill's 'decerebrate rat' experiment from about 50 years ago. Rats with only a brainstem could still end a meal using gut signals like stomach stretch and CCK. They couldn't eat more after a multi-day fast, though, because that requires forebrain (hypothalamic) circuits that track energy reserves over days to years and adjust brainstem meal control.

2. Leptin tells the brain how much fat you carry
Leptin is made only by fat, in direct proportion to how much you have, and its working receptor sits mostly on appetite neurons in the brain. Doug Coleman's experiments linking the bloodstreams of two strains of obese mice predicted a hormone and its receptor, and Jeff Friedman's lab cloned leptin in 1994. When fat is lost, leptin falls and triggers a starvation response: more hunger, lower energy expenditure and body temperature, less spontaneous movement, even reduced fertility.

3. Leptin failed as a diet drug because obesity involves leptin resistance
Amgen paid about $20 million upfront for the patent, but obese people already have high leptin, much as type 2 diabetics have high insulin. A reanalysis showed that people with the lowest starting leptin lost the most weight. Knight thinks leptin could still help maintain weight loss, when levels drop sharply, and isn't sure why that was never developed.

4. AgRP hunger neurons predict how much you'll eat before the first bite
A few thousand AgRP neurons at the base of the hypothalamus drive hunger: stimulate them and full mice eat voraciously; silence them and mice starve. His student Yiming Chen expected their activity to fade gradually during a meal. Instead it dropped within seconds of a hungry mouse seeing and smelling food, and the size of the drop predicted how much it would eat over 30 minutes. Hunger circuits constantly forecast what's coming rather than waiting for slow gut signals.

5. Body weight is about 80% heritable, yet obesity surged because the environment changed
Twin studies put heritability near 80%, second only to height. Around 10% of severe childhood-onset obesity involves mutations in the AgRP/POMC–MC4R pathway, and most of the roughly 1,000 genes linked to body weight act in the brain. 'Genetics loads the gun, environment pulls the trigger': genes set where you fall in the distribution, and cheap, ultra-processed, highly palatable food has shifted the whole distribution upward since about the 1970s.

6. Hunger circuits count calories; protein and salt get special defense
AgRP neurons respond equally to the same calories of sugar, fat or protein delivered into the stomach, so 120 calories of olive oil equals 120 calories of chicken. Protein, which supplies essential amino acids, and sodium are the nutrients the body defends most strongly, with dedicated appetites. Knight cites protein leverage: eating too little protein makes you eat more calories trying to reach a minimum.

7. Weight regain comes mostly from rising hunger, not a slower metabolism
Energy expenditure falls about 30 kcal a day per kilogram lost. Rudy Leibel found people who lost about 100 lb burned roughly 25% less than never-obese people of the same size. Kevin Hall gave people SGLT2 inhibitors, which make the body excrete about 90 g of glucose a day without their noticing, and found appetite rose about 100 kcal a day for every 2 lb lost. That hunger increase, he says, is the main reason weight comes back.

8. GLP-1 drugs work by vastly extending how long the hormone lasts
Natural GLP-1 lasts about 2 minutes, and DPP-4 inhibitors that raise it about threefold help diabetes but not weight. Exenatide, from Gila monster venom (2005), lasts about 2 hours, liraglutide about 13 hours (7–10% weight loss), and semaglutide about 7 days (about 16% loss in a year). The drugs act mainly on the brainstem: the nucleus of the solitary tract for satiety and the area postrema for nausea, which fades as the dose is raised gradually.

9. Dopamine drives wanting and learning, not enjoying food
Mice with no dopamine still like sweet tastes but won't work for food. Knight's lab found dopamine subsystems that fire tens of minutes after nutrients or water reach the gut and blood, teaching animals which flavors nourish or rehydrate them. This slow learning is how adults come to like bitter vegetables and coffee. In New Zealand, rabbits drank no water for nine months of the year, getting it all from food.

EXAMPLES

1. Kevin Hall's ultra-processed food trial
Inpatients were offered ultra-processed or whole-food diets rated equally tasty, for about two weeks each in random order. They ate more and gained weight on the ultra-processed diet and lost weight on the whole-food diet. Possible reasons include engineered fat/sugar ratios and the much larger volume of whole foods at the same calories.

2. Semaglutide cardiovascular outcome trial
In a roughly 20,000-person, four-year trial, semaglutide cut heart attacks, strokes and cardiovascular death. Much of the benefit appeared before significant weight loss and didn't correlate with how much weight people lost, pointing to possible anti-inflammatory effects through the brainstem's inflammatory reflex.

3. Next-generation drugs
Tirzepatide (Mounjaro/Zepbound) adds GIP agonism, which seems to counter nausea, for about 21% loss at a year. Lilly's triple agonist (GLP-1, GIP and glucagon, which raises energy expenditure) produced about 25% loss in a phase 2 trial with

weight still falling. Amgen's AMG 133 antibody blocks GIP instead, lasts about a month, and weight loss held for 6 months after stopping.

4. Thirst detects a 1% change

Brain osmosensors register about a 1% rise in blood concentration as thirst; a 10% rise is extreme discomfort and 20% is a hospital case. Bengt Andersson found the sensor in the 1950s by infusing salt into goats' brains.

OTHER RELEVANT

1. Simple, evidence-based ways to eat less

Knight's own guidelines: cut ultra-processed foods, eat whole foods for volume and satiety, and get enough protein, which is filling, avoids protein leverage and costs more energy to digest. Simplifying your diet also works through sensory-specific satiety, which reduces appetite for flavors you've already had a lot of.

2. Drink water with meals

He calls the idea that water dilutes digestive enzymes a myth. Water helps if you're mistaking thirst for hunger, though it adds little stomach stretch because it empties quickly, whereas caloric drinks are held back by intestinal feedback.

3. Protect muscle on GLP-1 drugs

Without resistance training or higher protein, 25–33% of weight lost through diet or drugs can be muscle. Lifting and adequate protein can largely prevent that, which matters most for older adults. Knight considers the drugs remarkably safe so far, but notes their doses push hormone levels far above natural.

4. What you're told shapes how full you feel

Huberman cites Alia Crum's milkshake study, in which labeling the same shake as high-calorie changed hormone responses. Knight adds that in human flavor-learning studies, showing nutrition labels changed expectations enough to erase the effect.

How Smartphones & Social Media Impact Mental Health & the Realistic Solutions | Dr. Jonathan Haidt

Guest: Dr. Jonathan Haidt
Date: 2024-06-10 · Duration: 2:26:55
URL: https://www.youtube.com/watch?v=csubiPlvFWk

KEYPOINTS

1. The 'great rewiring' happened between 2010 and 2015
In January 2010 most teens had flip phones, used to call and text. There was no Instagram and no front-facing camera. By 2015 most had smartphones with front cameras, high-speed internet and unlimited texting. Girls were mostly on Instagram, the first platform built for the phone. Haidt, a social psychologist at NYU, notes it's now possible to spend 10–15 hours a day on a phone. A flip phone never allowed that.

2. The mental-health curves bend sharply around 2012
Large US surveys show rates of anxiety, depression and self-harm fairly flat from the 1990s through 2010–2011, with about 12–15% of girls having had a major depression. Then the girls' lines rise 'like a hockey stick'. Most measures are up 50–150%, close to doubling for younger girls. Boys' curves rise more gradually, starting around 2009–2010. Haidt credits Jean Twenge with first raising the alarm.

3. It's not just self-report
Against the claim that Gen Z simply talks more openly about mental health, Haidt points to the same sharp rise in hospital admissions for self-harm and psychiatric emergency visits. The pattern appears in the US, Canada, Australia, New Zealand, the UK and Scandinavia. He says nothing else fits the timing, and that experimental data exist alongside the correlational data. He also stresses that why any one person is depressed has many causes.

4. From play-based to phone-based childhood
Pew and Gallup data put US teens at about five hours a day on social media alone, mostly TikTok and YouTube videos, plus screen time at school. Haidt argues that play, the basic thing young mammals do, has been displaced, and that a phone-based childhood is incompatible with healthy development. He compares a phone on a student's desk to having a TV, record player, walkie-talkie, guitar and paint set there during geometry class.

5. We fear the wrong dangers
Parents pulled kids indoors over fear of strangers. FBI figures Haidt cites show only about 100–150 true stranger kidnappings a year in the US; most abductions are by a non-custodial parent. Meanwhile overprotection plus phones has driven up suicides, which he argues cost far more lives than abolishing kidnapping would save. He blames the availability heuristic.

6. The trap has different bait for girls and boys
Borrowing Yascha Mounk's idea that a trap needs attractive bait and a way to stop you leaving, Haidt says girls, more oriented to relationships, were lured by social comparison and gossip on Instagram. Boys, more oriented to systems and 'effectance' (psychologist White's 1950s term for the thrill of causing an effect), went to video games and online worlds. Girls' online life is more performative and perfectionistic about image.

7. Pornography and dopamine
Huberman explains that big dopamine spikes that arrive without effort, as with amphetamine, cocaine or high-resolution pornography, wire reinforcement to short timescales, then deepen the trough below baseline. The result is less and less reward for more and more use, and it bypasses the effortful learning of courtship. Haidt doesn't demonize or celebrate porn. He asks who would want to date a young man who has watched it several times a day since 13.

8. Puberty is a sensitive period for becoming a person
Huberman says experience up to about age 25 strongly shapes the brain's social and sensory maps, and that puberty is the brain's fastest period of change, with hormones activating massive plasticity, including in the frontal lobe. Haidt argues puberty is a sensitive period for cultural learning, for how you become a person in your culture. That's why he urges delaying smartphones until late puberty.

9. The four norms
No smartphone before high school (a flip phone is fine). No social media until 16. Phone-free schools, with phones locked away in a Yondr pouch or locker all day, because 'keep it in your pocket' just means constant conflict. And far more independence, free play and real-world responsibility.

10. It's a collective-action trap
Social media is a social addiction. In 1997, the peak year, 37% of high schoolers smoked, but social media is all-or-nothing within a peer group. So families should act together. If four families change phone rules at once, no child is left out.

EXAMPLES

1. Summer camp as a detox
Haidt hears the same story repeatedly: an 11-year-old girl turns surly after getting an iPhone, comes back from a phone-free camp as her sweet self, then turns surly again once back on the phone. His rule: never choose a camp that doesn't ban phones.

2. Free Play Friday
Pair restrictions with something positive. Clear Friday afternoons of lessons and give kids money to go out together and have adventures, so it feels like fun rather than deprivation.

3. Regain control of attention
In Haidt's NYU flourishing course, students first turn off nearly all notifications (Uber, which tells you the car is three minutes away, is worth keeping), and remove social media from their phones, using it on a computer if needed.

4. The awe walk
Adapted from Dacher Keltner, who used awe walks to process his brother's death: walk somewhere beautiful, a little slower than usual, with no phone or earbuds, and just notice. Students walking Washington Square Park report lower anxiety and 'heart opening'. Haidt now uses his AirPods far less.

5. Dynamic subordination
Huberman describes elite SEAL squadrons where leadership shifts to whoever has the needed skill. Haidt and Huberman argue that boys learn this through low-stakes physical play and conflict that online life replaces.

OTHER RELEVANT

1. Focus on the medium, not just the content
Citing Marshall McLuhan and Neil Postman, Haidt says social media is more addictive than TV because of constant behavioral rewards and because it's performative.

2. Act as a group
Talk with the parents of your child's friends and with school principals, many of whom want phone-free schools but fear parents' objections.

3. Policy and resources
Haidt urges support for the Kids Online Safety Act (KOSA). He points to anxiousgeneration.com and LetGrow.org, and rates his optimism 10 out of 10.

LIVE EVENT Q&A: Dr. Andrew Huberman at the Brisbane Convention & Exhibition Centre

Date: 2024-06-07 · Duration: 0:53:08
URL: https://www.youtube.com/watch?v=-e9ErUozQo4

KEYPOINTS

1. Nicotine itself isn't what causes cancer; the delivery method is
Smoking, vaping, dipping and snuffing are the cancer risks. Huberman calls vaping 'bad', probably slightly less bad than smoking, and grants that it has helped some people smoke less. Nicotine acts on nicotinic acetylcholine receptors and is a genuine cognitive enhancer for attention and focus, but it reliably raises blood pressure and constricts blood vessels.

2. Nicotine tolerance builds fast and young brains should avoid it
Because the effect fades with daily use, people need more and more. Huberman says he has never used nicotine. He advises against it for young, highly plastic brains, and suggests adults avoid it unless they really need the boost and can tolerate the rise in blood pressure.

3. ADHD care works best when you combine tools instead of picking sides
Huberman notes that most ADHD drugs (Vyvanse, Adderall, Ritalin) are amphetamines or similar stimulants. They have real clinical value because boosting dopamine and norepinephrine can help the brain practice focus and strengthen those circuits through plasticity. He argues that behavioral, nutritional, supplement and prescription tools can be combined, and that the non-drug tools may allow lower doses for people who want that.

4. Dosing habits for stimulant medications have shifted over time
Huberman says these drugs were originally taken on weekdays only, a pattern that has drifted toward daily use. He notes that few people who respond well ever come off them. There's nothing magical about turning 25, but some people need less over time as their attention circuits strengthen.

5. Focus has to warm up; it doesn't switch on instantly
Huberman argues that visual and mental focus are closely linked, citing visual-target training used in some schools and clinics in China, where children practice holding their gaze on a distant point before starting work. Taking 5–10 minutes to settle into focus doesn't mean you have an attention disorder, any more than needing a warm-up jog means you can't run. He also notes how little science actually knows about 'flow'.

6. Years of short sleep can largely be recovered from
To someone who got about five hours a night for 15 years, Huberman says substantial damage is unlikely unless the pattern lasted a lifetime, and the brain compensates well. He cites Matt Walker's QQRT framework: quantity (needs vary, so seven hours for years is no reason to panic about dementia), quality, regularity (roughly the same bedtime ±1 hour, at least five nights a week) and timing (chronotype).

7. 'Adrenal burnout' is a myth, but psychological burnout is real
Huberman says the adrenals hold enough adrenaline 'for two lifetimes' and don't burn out, though genuine adrenal insufficiency exists and is rare. Burnout tends to arrive months after the stressful period, not during it, and is often followed by depression. His suggestion is rest plus actively seeking things that bring delight or meaning, drawing on poet David Whyte's idea of wholeheartedness.

8. Eating minimally processed foods may help appetite match real nutrient needs
Huberman's hypothesis is that when foods are eaten close to their original form, the brain can link taste with the macronutrient and micronutrient content the gut is sensing, so cravings become more specific. He points to emerging work by Dana Small at Yale and Kevin Hall. He thinks this may be why some people feel better on elimination diets such as carnivore: those diets may reset the circuits that drive appetite.

9. Breathing patterns change heart rate in predictable ways
Through respiratory sinus arrhythmia, inhaling speeds the heart slightly and exhaling slows it. Vigorous cyclic hyperventilation (Wim Hof or tummo breathing) increases arousal and adrenaline. Exhale-weighted patterns such as cyclic sighing calm you down. Box breathing, with roughly equal inhales and exhales, keeps heart rate even. In short: lengthen inhales to feel more alert, lengthen exhales to feel calmer.

10. Testosterone replacement is often started too young
Huberman distinguishes true replacement (levels below about 300 ng/dL, or clinical symptoms) from what he calls 'testosterone augmentation therapy' in men whose levels are already normal. TRT sharply lowers sperm count, so men who may want children need something like hCG to offset it. He notes that women have more testosterone than estrogen in their blood, though less than men.

EXAMPLES

1. The Nobel laureate who chewed six pieces of nicotine gum in 30 minutes
During a meeting at Columbia, a scientist then in his late 70s told Huberman he chewed Nicorette to ward off Parkinson's and Alzheimer's, possibly via acetylcholine activation and preservation of dopamine neurons. Huberman presents this as intriguing, not as a recommendation.

2. From one Zyn pouch twice a week to a canister a morning in a month
Huberman's example of someone he knows, used to show how quickly tolerance to nicotine builds.

3. Waking after four hours and using NSDR to get back to sleep

Huberman says he often wakes about four hours into the night and has learned to fall back asleep with non-sleep deep rest (yoga nidra). He did a 20-minute session right before going on stage, and points to free 10-minute versions online.

4. Huberman's own eating pattern

Water and caffeine early, a first meal around 11 am–noon, and eating mostly between 11 am and 8 pm, though he isn't strict about it: meat, fish, eggs, fruit, vegetables, rice and plenty of oatmeal, with extra starchy carbs after hard resistance training.

5. Fatal mix: hyperventilation plus breath holds in water

Hyperventilating blows off carbon dioxide, which is what triggers the urge to breathe, so you can black out underwater without warning. Huberman says never to combine cyclic hyperventilation and breath holds anywhere near water, 'even standing or seated in a puddle'.

OTHER RELEVANT

1. Minimal plan for a busy schedule

Get bright daylight every day, even through clouds. Use dim or red light in the evening (he travels with a simple red bulb). If you train only two days a week, include resistance training. Andy Galpin's 'exercise snacks' (about 60 seconds of near all-out effort, such as stair runs or jumping jacks) can carry over to measures like VO2 max.

2. A sequence to follow before considering TRT

First sort out sleep, exercise, nutrition and stress, and avoid overtraining. Then consider supplements such as zinc or tongkat ali, whose effects are debated. Only then, if it fits your ethics and sport rules, use the minimum effective dose and protect fertility. He warns that growth-hormone-raising peptides grow all tissues, including undetected tumors.

3. Morning light for children too, with care

Low-angle morning and evening sun has less UV, but no one should stare at the sun. Kids can sleep in; the problem is staying indoors on a phone until noon.

4. Parenting ideas from Dr. Becky Kennedy

Set boundaries so children feel safe, help them feel 'real' (seen), and respond to their feelings with 'I believe you' without having to grant the request. Avoid 'impinging' on their healthy, distinctive interests, such as forcing violin on a child who wants drums. Teach stress tools like the physiological sigh early.

How to Navigate Menopause & Perimenopause for Maximum Health & Vitality | Dr. Mary Claire Haver

Guest: Dr. Mary Claire Haver
Date: 2024-06-03 · Duration: 2:18:18
URL: https://www.youtube.com/watch?v=6P8hrzjnetU

KEYPOINTS

1. Menopause marks the end of ovarian function, not just of periods

Haver, an OB-GYN, objects to defining menopause as one year after the final period, since women with hysterectomies, IUDs, ablations or PCOS may not have periods to track. Women are born with 1–2 million eggs, are down to about 10% by 30 and about 3% by 40. Menopause means essentially no eggs left, so ovarian estradiol and progesterone drop sharply and testosterone falls to about half or less of peak levels.

2. Perimenopause is a 'zone of chaos'

As eggs run low, the ovary responds poorly to pituitary signals. The brain sends ever-larger FSH pulses, producing erratic, sometimes very high estrogen surges on an overall downward trend. Because levels swing so much, no reliable blood test exists; diagnosis is by symptoms after ruling out other conditions. About 90% of women experience abnormal bleeding, and fatigue is common.

3. Mental health is one of the best-documented perimenopause effects

Serotonin, norepinephrine and dopamine systems are sensitive to sex hormones. Haver cites at least a 40% increase in mental health disorders, with SSRI use doubling across the transition. She reports newer data showing that perimenopausal women on hormone therapy have less new-onset depression, and that some neuroscientists now favour estrogen over an SSRI for perimenopausal depression.

4. Timing of menopause has modifiable and genetic factors

Smokers reach menopause earlier than they otherwise would. Hysterectomy with ovaries retained takes about four years off ovarian life, and tubal ligation about a year and a half. Average onset is around 51, roughly a year and a half earlier in African-American women and later in Asian women. Ovulation-suppressing birth control delays it by at most about nine months; egg harvesting doesn't bring it forward.

5. Long gaps without estrogen carry real risk

Early menopause is defined as 40–45 and premature ovarian insufficiency as before 40. Haver's youngest patient was 27, after 18 months of missed diagnosis. Untreated premature ovarian insufficiency is linked to earlier death and more cardiovascular disease, diabetes and stroke. Haver says aggressive early hormone therapy can negate most of these risks.

6. The WHI headlines overstated breast cancer risk

The 2002 Women's Health Initiative excluded women with hot flashes and enrolled women averaging 63, about 12 years after the typical onset of menopause. In the estrogen-plus-progestin arm, breast cancer went from about 4 to 5 per 1,000 women per year — a 25% relative increase that was not statistically significant. The estrogen-only arm showed about 30% less breast cancer. Results announced at a Watergate Hotel press conference before publication drove HRT use and menopause training sharply down.

7. The 'timing hypothesis': start early

An American Heart Association re-analysis found that starting hormone therapy at ages 50–59 was associated with about 50% lower cardiovascular disease, cardiovascular death and all-cause mortality. Estrogen appears better at prevention than cure: in women with established plaque, there is concern it may destabilize it, especially in the first year. A BMJ study linked longer lifetime estrogen exposure to better cognition scores. Haver plans to stay on her estradiol patch indefinitely absent a contraindication.

8. Route and molecule matter

Oral estrogen passes through the liver and can slightly raise clotting factors, so Haver defaults to transdermal patches, especially with a personal or family clotting history such as factor V Leiden. She favours estradiol and progesterone over synthetics, and women with a uterus must take a progestogen to protect the uterine lining. Contraindications include unevaluated abnormal bleeding, active clots, severe liver disease and some hormone-sensitive cancers, though a cancer history doesn't automatically disqualify someone.

9. Body composition, not weight, is the key metabolic shift

Weight gain follows a linear age curve that menopause doesn't seem to change. What shifts is muscle loss and visceral fat gain, and the gut microbiome moves toward a male-type profile, per the ZOE study of about 1,100 women. Haver uses a body scanner and the waist-to-hip ratio: below 0.7 suggests low visceral fat, while above 1 likely means high levels.

EXAMPLES

1. Only 10% are offered treatment

Haver cites 2023 data: of women reporting menopausal symptoms to a doctor, only about 10% are offered any therapy, and they're about four times more likely to be offered an antidepressant. Her goal isn't that every woman takes HRT, but that every woman gets an informed conversation.

2. Testosterone for women, off-label

There's no FDA-approved product for women. Haver compounds a transdermal cream and aims for about 50–70 ng/dL (healthy peak roughly 35–70; above 90 prompts a check for tumor or PCOS). It works for hypoactive sexual desire disorder. She also uses it off-label for osteopenia and sarcopenia, saying that is 'probably helpful' but unproven.

3. Vaginal estrogen prevents urinary infections
Genitourinary syndrome of menopause eventually affects nearly everyone. Low-dose vaginal estrogen avoids the breast-cancer and clotting debate, and Haver calls it the best treatment for recurrent UTIs. She estimates that preventive use could keep about half of women out of the ER and away from urosepsis.

4. Hip fracture stakes
After 65, one-year mortality after a hip fracture is about 30% with surgical repair and higher without it. Haver says much osteoporosis is avoidable with deliberate prevention, which can include HRT.

5. Alcohol and sleep
Haver can no longer drink more than a glass of wine without waking at 2–3 a.m. sweating; thousands of followers report the same. She says the mechanism is unclear. Oral progesterone at bedtime appears to help sleep, probably via GABA.

OTHER RELEVANT

1. Haver's prevention pack
Eat 25–32 g of fiber a day (most women get 10–12) and 80–120 g of protein (most get 50–60). Strength train three to four days a week, wear a weighted vest, take 5 g of creatine monohydrate a day, and test vitamin D (about 80% of her patients are deficient). She mentions a specific bioactive collagen studied in osteoporosis, disclosing that she sells one.

2. Be realistic about supplements for hot flashes
A Menopause Society review found little beyond CBT that reliably helps hot flashes. Haver sees some 'okay' data for turmeric but says it isn't a substitute for hormone therapy, which remains the gold standard.

3. Get abnormal bleeding checked before starting HRT
Heavy, clotting or unusual bleeding should be evaluated by a gynecologist first.

4. Talk about contraception when starting a GLP-1
Weight loss can restore ovulation in PCOS. Haver urges prescribers to discuss contraception, as happened after bariatric surgery.

The Science of Your Gut Sense & the Gut-Brain Axis | Dr. Diego Bohórquez

Guest: Dr. Diego Bohórquez
Date: 2024-05-27 · Duration: 2:42:13
URL: https://www.youtube.com/watch?v=SZSRgyl7pyQ

KEYPOINTS

1. Gut hormone cells turned out to be wired to nerves
The gut lining is a single layer of epithelial cells. Scattered among them, at roughly 1 per 1,000, are enteroendocrine cells, named by German physician Friedrich Feyrter in 1938 and long thought to signal only by releasing hormones. In 2015, Bohórquez's group reported that roughly a third to two-thirds of them make direct contact with nerves.

2. A 'neuropod' reaches out like Adam's hand
Some of these cells grow a long arm with a little 'hand' at its base, which Bohórquez compares to Michelangelo's Adam reaching toward God. After describing it with an unwieldy 'axon-like pseudopod basal process', he coined 'neuropod'. In a dish, isolated gut cells and sensory neurons found each other within hours and re-formed the circuit, which he first saw in June 2012.

3. One synapse separates your gut from your brainstem
Using a rabies virus engineered to jump just one connection, the lab found label in the nodose ganglion, the vagus nerve's cluster of cell bodies just below the neck, and in the brainstem. That makes it a fast, mostly subconscious line. Hormones act over minutes to hours; this transmission works in milliseconds.

4. The gut senses almost everything you eat
Cells differ by location: sugar sensing is concentrated in the upper small intestine, while fiber and fermentation products such as butyrate and propionate are sensed in the colon. Bohórquez expects receptors will be found for nearly everything we eat, along with stretch and temperature; the esophagus brings hot coffee to body temperature within seconds.

5. One glucose molecule is read in layers
Glucose activates the sweet receptor T1R3. Sodium-glucose transporters then depolarize the cell, and metabolizing the glucose into ATP depolarizes it further. The cell releases glutamate onto the vagus within milliseconds, acting on fast ionotropic and slower metabotropic receptors. A neuropeptide follows to complete the experience of 'I got sugar'.

6. Silence the gut cells and mice can't tell sugar from sweetener
Mice normally pick sugar over a noncaloric sweetener such as stevia, by the second day within about 90 seconds. When the lab used optogenetics to switch off neuropod cells in a small stretch of intestine just past the stomach, the mice became 'blind' to the difference. Switching the cells on made mice treat sweetener, or even plain water, as if it were sugar.

7. Gastric bypass rewires cravings, not just capacity
At Bohórquez's first Thanksgiving, a woman told him she lost about 40% of her body weight within six months, from around 300 pounds. Her diabetes resolved within a week, and sunny-side-up egg yolks went from nauseating to craved. He says food-choice changes after bypass were first reported clinically around 2011, and that patients' risk of alcoholism rises roughly two- to sevenfold.

8. GLP-1 works on a slower clock
Asked about GLP-1 drugs such as Ozempic and Mounjaro, Bohórquez explains that gut cells release GLP-1, mainly in response to sugar, onto vagal nerve endings. GLP-1 also acts in the brainstem to reduce appetite. The millisecond signals shape choice and how food feels; hormones like GLP-1 govern how much you eat and when hunger returns, roughly every four hours.

9. Protein is tracked closely
Bohórquez describes recent animal work: when protein is removed entirely from a diet, the gut detects it and animals stop eating it, unless it is rich in fermentable fiber that lets gut microbes make essential amino acids. When protein is merely low, animals eat more to compensate. This fits Stephen Simpson's protein leverage hypothesis; protein is the most satiating macronutrient. Bohórquez flags the gut-cell link as not yet published.

EXAMPLES

1. Gut pain cells and IBS
David Julius and Holly Ingraham at UCSF showed that serotonin-releasing cells in the colon couple to spinal nerve fibers and drive visceral hypersensitivity. Bohórquez calls this a biological basis for what can become irritable bowel syndrome and other disorders of gut-brain interaction.

2. Three sisters agriculture
Indigenous farmers plant corn, beans and squash together; Bohórquez remembers his parents sowing beans to climb the corn. On the plate, this pattern of carbohydrate, amino acids and fiber recurs worldwide: a tortilla or bread, a protein, and vegetables, or rice with beans.

3. The guayusa hour
In Amazonian communities in Ecuador, families rise between 4 and 6 a.m. to drink guayusa, a holly relative of yerba mate with nearly coffee-level caffeine but less bitterness. Over it they discuss the previous day's problems and plan the day, then eat fat- and fiber-rich chonta palm fruit around 5:30, which carries them until about 3 p.m. Guayusa hot chocolate, he notes, kept him up until 3 a.m.

4. Walter Cannon's 'Voodoo Death'
Harvard physiologist Walter Cannon proposed that a spell from a powerful shaman could cause a fatal over-activation of the

peripheral nervous system. Bohórquez uses it to illustrate how learned beliefs, acting below awareness, can drive the body and underlie superstition.

OTHER RELEVANT

1. Vagus activation isn't always calming

Huberman stresses that vagus nerve stimulation can increase arousal; it is used clinically for depression. Long exhales and the physiological sigh (two inhales, then a full exhale) engage its calming side. Humming has been linked to vasodilation, which accompanies calm.

2. Interoception cuts both ways

Meditation can raise awareness of gut and heart signals, but some anxious people become so aware of their heartbeat that it is disruptive. More body awareness isn't always better.

3. Shared food may sync people

Bohórquez cites psychology findings that people eating similar food are more likely to connect in the moment, and behavioral economists' observation that deals happen over meals. He also suggests 'hangry' irritability may reflect gut and brain electrical rhythms falling out of sync, an idea he labels unpublished speculation.

4. Practice listening to the body

He frames self-care as listening to your body's signals rather than overriding them for career goals. Huberman adds Martha Beck's approach of sensing decisions through the body alongside pros-and-cons analysis.

How to Find Your True Purpose & Create Your Best Life | Dr. James Hollis

Guest: Dr. James Hollis
Date: 2024-05-13 · Duration: 2:39:48
URL: https://www.youtube.com/watch?v=SyWC8ZFVxGo

KEYPOINTS

1. The Self is not the same as your sense of self

Hollis, a Jungian analyst, uses the capital-S Self for the autonomous organism that digests food, heals and grows the way an acorn becomes an oak. It has two agendas: healing when injured and expressing itself. The ego is a small center of awareness built up from early experiences of "me" and "not me." Your sense of self is the fluid story you tell about who you are, shaped heavily by family and culture. A core message from his therapy work is "you are not what happened to you."

2. Complexes temporarily take over the ego

Following Jung, Hollis describes complexes as charged clusters of energy, or splinter personalities, that get triggered, take over conscious choice and run an old program. Jung's German term meant possession. No one wakes up planning to repeat decades-old self-defeating behavior, he says, but we do. The behavior is logical given its premise: a psychotic patient he saw breaking a window believed air was being pumped out of his locked room.

3. What was once protective becomes constrictive

Many patterns began as adaptations to childhood circumstances and were helpful then, but they restrict adult life. Hollis notes that sensitive children who tried to stabilize a troubled family often go into the helping professions: nursing, clergy, therapy. A child can't fix a parent, so the internalized mission never resolves.

4. First half of life: what does the world want of me? Second half: what does the soul want?

Early adulthood is spent building enough ego strength to meet parents', teachers', partners' and employers' expectations. Hollis semi-humorously calls the first half of life a huge and unavoidable mistake because it's lived reactively. The later question is what wants to come into the world through you. He stresses that this is not about age: it often arrives through a crisis in a marriage, career or mood.

5. Psychopathology means the suffering of the soul

Hollis reads the Greek literally. When we push our energy against what the psyche wants, the result over time is boredom, burnout and depression, often with self-medication. Meaningful work, by contrast, sustains people even through sacrifice. He treats depression as a signal with a task at the bottom of it rather than only something to get rid of.

6. The shadow: what we disown in ourselves

The shadow includes jealousy, envy, aggression and greed, and also group shadows such as national bloodlust or fashion conformity. It shows up when we live it out unconsciously, project it onto others (the speck in another's eye), or get swept up in crowds, where the larger the group, the lower each person's consciousness. Hollis quotes Terence: "nothing human is alien to me." He cites Jung's 1937 Yale lecture: owning your shadow is the best thing you can do for society, because it takes your unfinished business off your partner and children.

7. The greatest burden a child bears is the unlived life of the parent

Hollis quotes Jung: where parents are stuck, children will be stuck or spend their lives getting unstuck. The best gift is to model a life lived with as much courage and integrity as you can manage, which gives children permission to feel, desire and fight for what matters to them rather than living by conditional love.

8. Relationships grow through the otherness of the other

In his book The Eden Project, Hollis describes the childlike wish for a partner who will read our minds and meet our needs, a fantasy both people project. The real gift is the friction of encountering someone different. He cites Joseph Campbell: sacrificing to your partner breeds resentment, but sacrificing to the shared project of the relationship nourishes you.

9. Men's lives are governed by roles and fear

In Under Saturn's Shadow, Hollis argues that men's lives were as role-bound as women's. He describes a culture of competition, fear of being a loser and fear of the feminine, including the feminine within. Wherever you see macho behavior, he says, you're seeing fear-based overcompensation. When women's groups ask him to explain men, he tells them to imagine losing every confidant, being cut off from their intuition, and being valued only on strangers' standards of productivity.

EXAMPLES

1. His own midlife depression

In his 30s, having achieved what he wanted as a tenured professor, Hollis became seriously depressed. He realized that asking how to get rid of it fastest was the wrong question. The better one was why his psyche had withdrawn its support from a perfectly good agenda. It led him to leave academia and train as an analyst in Zurich, and he now views the depression as beneficent.

2. The students who couldn't look

In a three-hour seminar on the psychodynamics of love, bright 19-to-22-year-olds grasped projection and transference easily, but shut down when asked to apply the ideas to their own relationships. In another course, students imagining their 40s all pictured perfect marriages, adoring teenagers and satisfying careers.

3. The Kleenex box

A man sent to therapy by his wife sniffed at the tissue box, saying Hollis must have had a woman in before him. Hollis told him every man has a lake of tears and a mountain of anger inside. The man insisted there were better ways to cope and left after about five sessions.

4. Starter marriages

A colleague who worked with couples privately spoke of starter marriages. These are often formed to escape or replicate one's parents, or to have someone take care of one's insecurities, and the reasons get outgrown. Hollis says he wouldn't automatically applaud a 50- or 60-year marriage. He'd want to know what happened to each person's soul within it.

5. His father and the librarian

Hollis's father left school in eighth grade for a lifetime of factory work. He was a good man by the standards of his day who, Hollis believes, never lived his own soul. A local librarian let young Hollis leave the children's section, and he devoured biographies looking for clues about how to live a larger life.

OTHER RELEVANT

1. Find your patterns three ways

Look at recurring self-defeating patterns in your own history. Ask your spouse, children or close friends where you hurt yourself or others, if you can bear to hear the answer. Pay attention to dreams: Hollis says sleep research puts the average at about six a night, and over time they reveal a point of view.

2. Build in daily reflection

Hollis spends 15 minutes each morning reflecting, often on a dream, and reflects again in the evening on the stories he's living. His late colleague Marion Woodman asked clients for an hour a day. Anything that takes you out of stimulus-response mode, whether a run, music or Huberman's anatomical drawing, can surface insight and, Hollis argues, is the cure for loneliness.

3. Ask what the swampland requires of you

From his book Swamplands of the Soul: anxiety, depression, loss and betrayal will come. Ask what the experience makes you do and what it keeps you from doing. After a betrayal, for example, the task is recovering self-worth, because no other choice will be good without it.

4. Shut up, suit up, show up

His daily motto. Shut up: stop whining, given what others face. Suit up: prepare and do the work. Show up: show up rather than show off, and step into life by the lights that matter within rather than what others say.

Dr. Matt Walker: The Science of Dreams, Nightmares & Lucid Dreaming | Huberman Lab Guest Series

Guest: Dr. Matt Walker
Date: 2024-05-08 · Duration: 2:33:05
URL: https://www.youtube.com/watch?v=Jy4rJcYmtUM

KEYPOINTS

1. Vivid, story-like dreams come mainly from REM sleep, and humans have unusually high amounts
Walker explains that bizarre, hallucinatory, emotional dream narratives are reported principally from REM sleep. Most primates spend about 9% of sleep in REM, while humans average about 20%, an anomaly he links to our move from sleeping in trees, where REM's loss of muscle tone is dangerous, to sleeping on the ground. Across species, REM appears in birds and mammals and seems to have evolved twice independently, while insects, reptiles, amphibians and fish mostly show only non-REM sleep.

2. Dreaming brains switch off logic and noradrenaline
During REM, visual, motor, memory and emotional regions become more active, but the dorsolateral prefrontal cortex, which supports rational thought, is quieted. That explains why absurd dream events feel normal. Noradrenaline drops to floor levels, which Walker connects to dreams' loose, distorted, 'fuzzy logic' quality. In rodents, memory replay during REM runs at about half speed, which may relate to time stretching in dreams, though this hasn't been confirmed in humans.

3. Dreaming of the specific problem is what helps
REM sleep is necessary but not sufficient for creative insight and emotional processing. Walker's rule is that benefits depend on dreaming of the specific content you're working through. Emotional concerns and people of significance run like a 'red thread' from waking life into dreams, which is why he calls dreaming 'overnight therapy' and 'emotional first aid.'

4. Nightmare disorder is defined by daytime impact
Occasional nightmares are normal. Nightmare disorder applies when they recur frequently and their emotional residue 'drenches' the following day. Huberman describes a recurring nightmare he has had countless times.

5. Image rehearsal therapy rewrites a nightmare's ending
With a therapist, you write out the nightmare, then craft and repeatedly rehearse a new ending. Walker's example: instead of crashing at a junction, you gradually apply the handbrake, stop safely and call for help. Each reactivation followed by sleep 'edits' the stored memory, like revising a document over several days, so nightmare frequency falls. It helps about 66% of patients.

6. Lucid dreaming is real, but its value is unsettled
Lucid dreamers in sleep labs signal with pre-agreed left-right eye movements, since the eyes aren't paralyzed during REM. A German group's brain scans confirmed that 'moving my right hand' in a lucid dream activates the same motor regions as real movement. During lucidity, the frontal regions normally offline in REM come back on. Walker argues both sides. Lucid dreaming is rare, which questions its necessity, and some lucid dreamers report less refreshing sleep, possibly a shallower, more active REM. The evidence isn't in.

7. Lost sleep can't be fully repaid
After sleep deprivation, people sleep longer on the following nights but recover only a fraction. Walker cites roughly two to four extra hours, and usually closer to two, or about 25% of a lost eight hours. That means you always carry some debt.

8. Older adults: delay bedtime and consider targeted medications
Late-night sleep becomes fragile with age, and the circadian rhythm shifts earlier, causing 4 a.m. wake-ups. Walker suggests gradually pushing bedtime later, which builds sleep pressure that can carry you later into the morning, plus CBT for insomnia. Speaking as a scientist, not a physician, he says some medications show promise: trazodone (more for falling asleep, with some pushback), DORAs (dual orexin receptor antagonists), and low-dose doxepin (3–6 mg, sometimes as about 0.5 mL of liquid) for staying asleep.

9. Menopause disrupts sleep mainly through hot flashes
Hot flashes heat the body when it needs to stay cool to remain asleep. Non-drug options are a cool bedroom and cooling mattresses, which Walker says many menopausal women have found helpful based on feedback relayed by a mattress company's CEO. He mentions bioidentical hormone replacement as a contested medical option to discuss with a physician.

EXAMPLES

1. Rosalind Cartwright's divorce study
Cartwright recorded sleep and dream reports in people going through painful events such as bitter divorces, then followed them for a year. About half achieved clinical remission from their depression. The difference wasn't simply dreaming, but whether they dreamed about the painful experience itself.

2. Boosting nightmare therapy from 66% to 92%
Sophie Schwartz's group at the University of Geneva paired image rehearsal therapy with targeted memory reactivation. A pleasant piano chord played about every 10 seconds while patients rehearsed the new ending, then was replayed quietly during REM sleep. Effectiveness rose from about 66% to 92%.

3. Targeted memory reactivation with sounds
In a memory card-pair game, each pair is linked to a congruent sound (a fire engine siren, a whistling kettle). Replaying half the sounds below waking threshold during sleep strengthens those specific pairs relative to the unreplayed ones. Walker compares it to a 'bespoke playlist' for consolidating what matters.

4. Rick Rubin's dream tip

Huberman shares an untested tip from Rick Rubin that he says has worked every time for him. To recall a good dream, lie completely still with your eyes closed and it will come back. After a nightmare, get up, move and even turn on lights to shake off the emotional residue.

OTHER RELEVANT

1. Short-circuit bedtime rumination

Use meditation or other methods that get 'your mind off itself.' If you wake in the night and can't drift off, reframe the time as welcome rest instead of panicking. Otherwise, get up rather than teaching your brain that bed means wakefulness.

2. Hide the clock

Repeatedly checking the time at a habitual waking hour, like 3:30 a.m., reinforces that wake-up through learning. Remove visible clock faces from the bedroom.

3. Avoid back sleeping and screen for snoring

Sleeping on your back raises the risk of airway collapse. Walker uses the SnoreLab app, which records breathing and lets you replay snoring spikes, and suggests a few nights of recording. Alcohol worsens snoring. If snoring is confirmed, see a doctor. He says about 80% of people with sleep apnea are undiagnosed, and treatment can feel like 'wiping a fogged glass clear.'

4. Supplements are the last few percent

Walker cites some evidence for magnesium (if deficient, possibly by relaxing muscles), chamomile, glycine at about 1.5–2 g, and phosphatidylserine, which blunts cortisol in athlete studies and might help insomniacs whose cortisol spikes at sleep onset. Valerian's data don't hold up. His single biggest tip is regularity: a consistent schedule that matches your chronotype.

Transform Your Health by Improving Metabolism, Hormone & Blood Sugar Regulation | Dr. Casey Means

Guest: Dr. Casey Means
Date: 2024-05-06 · Duration: 2:56:27
URL: https://www.youtube.com/watch?v=8qaBpM73NSk

KEYPOINTS

1. Many chronic diseases share a 'trifecta of bad energy'
Means names chronic inflammation, mitochondrial dysfunction and oxidative stress as the common biology behind type 2 diabetes, obesity, fatty liver, PCOS, erectile dysfunction and more. She argues that about 90% of US healthcare spending goes to downstream symptoms of these processes, and that you can't operate on oxidative stress.

2. Underpowered cells trigger a 'cell danger response'
Using chronic sinusitis as an example, Means says the pus and swelling are symptoms; the disease is cells that can't make enough ATP. Struggling cells release ATP outside the cell, where its concentration is normally about a million times lower, and this acts as a danger signal that activates innate immunity. The threat can be a virus, a toxin, missing micronutrients or psychological stress.

3. Modern life overwhelms mitochondria on several fronts
Means lists the changes: shorter, fragmented sleep; sitting about 80% of the waking day; Americans spending about 93% of their time indoors; around 80,000 synthetic chemicals in food, water and household products; thermostats that keep us at a constant temperature; and 60–75% of calories from ultra-processed, nutrient-poor food. She thinks cells deprived of what they need drive you to keep eating.

4. Insulin resistance starts as a protective response
When mitochondria can't handle incoming fuel, cells reject glucose, insulin rises and blood glucose eventually climbs. Means explains that triglycerides reflect excess carbohydrate stored as fat in the blood, not dietary fat. She links rising insulin to higher blood pressure as well.

5. Frequent short bouts of muscle contraction beat one block of sitting-then-exercise for glucose
Muscle contraction moves glucose channels to the cell membrane without needing insulin. Means describes studies (paraphrasing two with similar results) in which 60 minutes a day of walking or light jogging, done as 20 minutes before meals, 20 minutes after meals, or 2–3 minutes every 30 minutes, produced the lowest 24-hour glucose and insulin in the frequent-bout group. The total time was the same in every group.

6. GLP-1 can be supported with food
Short-chain fatty acids made when gut microbes ferment fiber and polyphenols encourage the gut to make more GLP-1-producing L cells. Fermented foods such as sauerkraut, kimchi, kvass, miso, natto and Greek yogurt deliver these fatty acids directly. Means notes people with type 2 diabetes have far fewer L cells, though cause and effect is unclear.

7. Meal timing affects glucose
Means cites controlled studies where eating identical food and calories in a 6-hour window rather than a 12-hour window gave significantly lower 24-hour glucose and insulin. Because melatonin rising toward sleep may briefly impair insulin sensitivity, she eats lower-carb later in the day.

8. Cold and heat are useful but secondary
Means uses cold to signal mitochondria to make heat and to encourage mitochondria-dense brown fat, while saying the data are mixed. Heat also appears to help metabolic health. She ranks both below food, sleep and movement, calling them inexpensive tools that don't replace the basics.

9. A CGM shows things a single fasting glucose misses
Means highlights glycemic variability, area under the curve and the dawn effect, a jump of 5–30 points on waking. Some rise is normal, but research links a larger dawn effect to insulin resistance, and it may also reflect stress and a bigger cortisol awakening response.

EXAMPLES

1. 88% !’ 93.2%
A 2018 UNC study using basic metabolic-syndrome markers found 88% of US adults had suboptimal metabolic health. A follow-up in the Journal of the American College of Cardiology put the figure at 93.2%. Means notes the panel would cost under $100 out of pocket.

2. The standard cutoffs
Means' baseline ranges (she prefers tighter optimal targets): fasting glucose <100, triglycerides <150, HDL >40 for men or >50 for women, HbA1c <5.7%, total cholesterol to HDL ratio <3.5:1, waist <35 in for women or <40 in for men, and blood pressure <120/80, all without medication. HbA1c reflects average glucose over the roughly 90–120-day lifespan of red blood cells.

3. Spinach thylakoids and GLP-1
Means describes research in which about 100 g of spinach daily, roughly 5 g of thylakoids from plant chloroplasts, for 12 weeks raised GLP-1 secretion two- to threefold, though she says she doesn't remember the exact figure.

4. Soleus push-ups
Huberman raises a University of Houston study of seated, unweighted heel raises under a desk. The soleus is about 1% of

the body's muscle, yet the study reported disproportionate use of blood glucose. Means adds that small studies of under-desk treadmills look promising.

5. Activity gap

Means says 80% of Americans miss basic activity guidelines, 20% get essentially no activity, and the average is 3,000–4,000 steps a day, under 2 miles. US gym memberships have doubled even as metabolic health has worsened.

OTHER RELEVANT

1. Move every 30 minutes on top of real exercise

Take 2-minute breaks for walking, air squats or push-ups. Aim for at least 7,000 steps a day, plus resistance training 2–3 times a week and 150 minutes of moderate (or 75 of vigorous) cardio a week to build mitochondrial capacity. An under-desk treadmill or fidgeting adds non-exercise activity, which Rothwell and Stock's early work linked to leanness.

2. Ask for the seven basic markers and read them together

Request fasting glucose, triglycerides, HDL, HbA1c, total cholesterol, waist circumference and blood pressure, which are often free at an annual physical. Means wants patients to read the pattern as a picture of what's happening inside cells, rather than treating each flagged number algorithmically.

3. Eat to support your microbiome

Prioritize fiber, colorful polyphenol-rich plants, spices, tea and cocoa, plus 1–3 servings a day of low-sugar fermented foods. That last recommendation comes from Justin Sonnenburg and Chris Gardner's Stanford work. Kombucha tends to be higher in sugar. If you make your own sauerkraut, follow a careful recipe, because a bad ferment can be unhealthy.

4. Your bottleneck may differ from someone else's

Means lists food, sleep, movement, emotional health, toxins, light and temperature as the levers. One person's path may be mostly food and sleep, another's movement and stress. Time in nature and sunlight help break the cycle of fear and lost sense of control that she says keeps people stuck.

Dr. Matt Walker: Improve Sleep to Boost Mood & Emotional Regulation | Huberman Lab Guest Series

Guest: Dr. Matt Walker
Date: 2024-05-01 · Duration: 2:15:14
URL: https://www.youtube.com/watch?v=S_SrHS8FvMM

KEYPOINTS

1. No psychiatric condition comes with normal sleep
Walker says that in about 20 years of research his lab hasn't found a single psychiatric condition in which sleep is normal. Sleep problems appear in the diagnostic criteria of every major psychiatric disorder. The relationship runs both ways, and good sleep pushes toward mental wellness, not just away from illness.

2. Sleep loss boosts amygdala reactivity by about 60%
After a night without sleep, healthy people viewing neutral-to-unpleasant images showed roughly 60% more amygdala response than rested people. The threshold also dropped, so mildly emotional images started triggering reactions. A Japanese group later replicated the effect with under six hours of sleep for five nights.

3. The brake disconnects from the gas pedal
With sleep, the medial prefrontal cortex, the region behind the middle of your forehead, is strongly coupled to the amygdala and regulates it. Without sleep that connection is effectively severed: 'all emotional gas pedal and too little regulatory control brake'. That's why loud voices, cold water or extra requests grate when you're tired.

4. Sleep deprivation overreacts in both directions
A sister study found sleep-deprived people were also hypersensitive to rewarding images, with dopamine-related circuits overactive. That fits higher impulsivity, sensation-seeking and addiction potential when underslept. With Carl Hart, Walker found poor sleep predicted relapse during cocaine abstinence.

5. The 'loose hinge'
Huberman pictures the autonomic nervous system as a seesaw. Walker's data showed that sleep-deprived people at rest sit in a flat, parasympathetic, unmotivated state; one of the earliest effects of sleep loss is low motivation. But the hinge is so loose that a small challenge flips them into strong sympathetic arousal, with no balanced middle.

6. REM sleep strips emotion from memories
People who slept after forming emotional memories showed reduced amygdala reactivity when recalling them; those who stayed awake the same length of time didn't. More REM sleep meant more softening. Walker calls it 'overnight therapy', removing the 'bitter emotional rind' while keeping the informational orange, so you sleep to remember and sleep to forget.

7. Why REM is a safe space
REM is the only time in 24 hours when noradrenaline is completely shut off in the brain; serotonin also falls. Acetylcholine rises, by about 30% above waking in some regions, while the hippocampus and amygdala stay very active. Emotional memories are replayed in a neurochemically calm environment.

8. Anxiety tracks sleep quality and deep sleep
After a night of total sleep deprivation, anxiety rose exponentially past about 16 hours awake. By morning, almost 50% of previously non-anxious participants reached the diagnostic threshold for an anxiety disorder. In everyday tracking, sleep quality (fewer awakenings), not quantity, predicted next-day anxiety. Contrary to the lab's REM hypothesis, deep non-REM sleep predicted overnight relief and re-engaged the frontal lobe.

9. Sleep disruption precedes suicidal thoughts and attempts
Short or poor sleep predicts suicidal thinking, attempts and deaths, and the disruption comes before each one, making it a possible early-warning biomarker. Insufficient sleep carries roughly two to three times the risk; nightmares carry roughly five to eight times. Research by Michael Perlis and Michael Grandner shows suicidal acts cluster around 1–4 a.m., near the circadian low.

10. Depression: early REM and a puzzling sleep-deprivation effect
In depression, the first REM period arrives abnormally early, and many antidepressants delay or reduce REM. Walker notes the debate over antidepressants and takes no side. Sleep deprivation lifts mood in only about 30–55% of depressed patients, may worsen others, and the benefit vanishes after the next sleep. Walker suggests it works by temporarily raising reward sensitivity, which depression's anhedonia lacks.

EXAMPLES

1. Dement's REM-deprivation experiments
In the 1960s, William Dement woke volunteers each time they entered REM. They went from six or seven REM attempts on the first night to about 17–18 by night five. By around day three they showed paranoia and hallucinations, and by day five signs bordering on psychosis.

2. Prazosin and PTSD nightmares
PTSD patients show high noradrenaline even during sleep. At a conference, psychiatrist Murray Raskind described veterans on the generic blood-pressure drug prazosin, which crosses into the brain, reporting that their nightmares stopped and their REM sleep recovered. Walker says replication has been mixed, and a psychological therapy for repetitive nightmares appears at least as effective.

3. Cannabis and REM rebound

Walker describes a listener who stopped after about seven years of cannabis use and had an 'explosion' of vivid dreams. He explains that THC (not CBD) suppresses REM, so stopping produces a rebound above normal levels.

4. NSDR in addiction recovery

At a trauma and addiction center run by Ryan Soave, patients started each morning with an hour of non-sleep deep rest (NSDR), especially in their first days, when they are badly sleep-deprived. Huberman notes there are no randomized trials yet.

OTHER RELEVANT

1. Sleep 20 minutes later for more REM

Most REM falls in the last quarter of the night, so extend sleep at the end, not the start. Avoid alcohol and THC, which suppress REM. Avoid 'social jet lag': a two-to-three-hour weekend shift is like flying Los Angeles to New York and back every weekend.

2. Boost deep sleep for anxiety

Keep a regular schedule, exercise and sleep in a cool room. A warm bath or shower before bed especially increases deep sleep. Alcohol fragments the first four hours of sleep, when deep sleep dominates, and raises anxiety over the long run.

3. Start with timing if you change one thing

For depression, Walker says circadian misalignment has some of the strongest evidence. Take the free Morningness-Eveningness Questionnaire and adjust your schedule toward your chronotype. Huberman reports lower mood when he goes to bed at midnight or later versus 8:30–9 p.m.

4. Bright days, dark nights, no 'junk light'

Huberman cites a Nature Mental Health study, which he recalls covering more than 80,000 people, linking more daytime light to fewer mental health symptoms. Dim or dark evenings had an independent benefit. Walker adopts Huberman's phrase 'junk light' for nighttime artificial light.

Protocols to Strengthen & Pain Proof Your Back

Date: 2024-04-29 · Duration: 2:08:04
URL: https://www.youtube.com/watch?v=PVmQOLYckKQ

KEYPOINTS

1. Much back pain comes from nerve roots being pressed on as they leave the spine
The spine alternates bony vertebrae and softer discs, with the spinal cord running through the middle. Nerve bundles exit between segments to reach muscles and carry sensation back in. A bulging (herniated) disc, compressed vertebrae or local inflammation can impinge those roots, so much of relieving back pain is about creating space for them and stabilizing the spine so it doesn't happen again.

2. Spinal cord tissue does not regenerate, which is why the spine is armored
The cord is central nervous system tissue, like the brain; after injury it mostly scars rather than renewing neurons. Vertebrae protect it while discs let it bend and twist, and the cord itself moves when you lean or rotate.

3. Pain is neural and multi-factorial, not only structural
Citing the biopsychosocial model discussed with Dr. Sean Mackey, Huberman notes pain involves prediction, history, psychology and inflammation. That said, feet, toes, pelvis, neck position, spinal erectors and the abdominal wall all shape the environment the spine works in, which is why many protocols here target areas far from the sore spot.

4. Your frame hints at whether you have a 'thick' or 'thin' spine
Per Dr. Stuart McGill, people with thicker wrists, knees and ankles tend to have thicker spinal segments: good at handling compression along the spine but less able to twist. Thinner-framed people tend to have thinner, more 'bendy' spines that tolerate less vertical load. McGill's willow versus oak analogy: thin spines should build more surrounding muscle; thick spines may need more work on rotational mobility.

5. Get a real diagnosis for severe or persistent pain
Huberman is explicit that a podcast can't diagnose back pain. Overuse imbalances (such as one-sided golf swings), compression injuries and ruptured discs differ, and ruptured discs often need surgery. Epidurals, painkillers and supervised rehab all have their place, and many cases do resolve with time if you avoid the aggravating movement.

6. Crunches and sit-ups can worsen a posterior disc bulge
Flexing forward squeezes the front of the vertebra-disc-vertebra 'sandwich' and can push the disc further out onto the nerve. Huberman made his own herniation worse by doing crunches before a physical therapist told him to stop. The curl-up was designed to train the abdominal wall without that flexion.

7. McGill's Big 3 favor short, hard holds over long static ones
Curl-up, side plank and bird dog are each done as roughly 8–10 second maximal contractions. Repeating short, intense contractions builds the nerve-to-muscle pathways for strong stiffening better than holding 30–60 seconds. McGill himself says the Big 3 are not exhaustive. Quality matters more than volume, so stop sets once form breaks down.

8. Stabilizers far from the spine matter: feet, toes and the front of the neck
Strengthening the deep front neck muscles helps hold the head away from the chest and may support nasal breathing. Being able to spread all your toes and move them independently activates the arch and shin muscles that form a stable base for the pelvis and spine. Huberman credits foot work with ending his shin splints when running.

9. Direction of disc bulge determines which exercises help or hurt
Huberman's bulge (around L3–L4) pushes posteriorly, so spinal extension relieves it and flexion aggravates it. Someone whose bulge goes the other way may need different work. Knowing your pattern also guides strength choices: he emphasizes posterior-chain work such as glute-ham raises and Nordic curls.

EXAMPLES

1. Huberman's Seattle back injury
Doing weighted reverse bench dips with plates on his lap, he felt something 'go'. By that morning he had sciatica-like pain from his mid-right back into the hip and down the leg, and was walking bent over 20–30 degrees. A physical therapist had him stop crunches and start cobra-style push-ups. The pain was almost gone in two to three days with no medication. He notes there was no control, so it may have resolved anyway.

2. Cobra push-up details and the wall version
Lie face down with legs together and toes pointed back, keep your hips on the floor and push up with a neutral head. Do 8–10 reps and hold the last one until you start to shake. People in too much pain for the floor version can stand about six inches from a wall and push the hips toward it. When the same L3–L4 issue flared years later, it settled again quickly with these.

3. The Oreo analogy for discs
The cookies are vertebrae and the cream is the disc. Even pressure spreads the cream out in all directions; squeezing one side pushes it out the opposite side; crushing it is like a rupture. Flexion pushes the cream backward, toward the nerves, in posterior bulges.

4. Fist trick from Pavel Tsatsouline
Clenching a fist raises contraction strength elsewhere because of bilateral neural wiring. Making a fist on the other hand gives you a harder handshake squeeze. Huberman applies this by planting a fist rather than a flat hand in side planks and bird dogs.

5. Medial glute protocol from Jeff Cavaliere

Lie on your side with the bottom leg on the floor. Point the top foot's toe down, touch it in front of you, then sweep the heel back and up. Do 5–10 reps, then hold the last one for 10–20 seconds with a thumb pressed on the top of the glute. Huberman uses it for low-low back pain from sitting, flying or heavy hip-hinge work, and does both sides.

OTHER RELEVANT

1. Big 3 dosing

Curl-up: one knee bent, hands under the low-back arch, tongue on the roof of the mouth, chest leads (not the chin), lift 5–10 degrees, 10-second holds. Use a descending ladder of 5, 4, 3, 2, 1 holds with 10–30 seconds of rest, then switch legs. Side plank: start with knees bent 30–40 degrees and progress to straight legs with the top foot in front. Bird dog: reach long and low, without arching, for 8–10 second holds. One or two sets of each takes 5–10 minutes. Huberman aims for once or twice a week.

2. Supported bar hang for decompression

Hold an overhead bar with your toes or heels still touching the floor, rather than a full dead hang. Stay 10–30 seconds without twisting, walk around, and repeat two or three times. Inversion tables work on the same logic, but inverting raises eye pressure, so people with glaucoma or a predisposition to it should avoid it.

3. Neck and toe drills

Press your fists under both sides of your jaw, tongue on the roof of the mouth, and push your chin down for 10-second static holds: 3–4 reps, 2–5 sets. Practice spreading your toes so none touch, using tissue or toe spreaders if needed, then work on lifting each toe independently.

4. Bracing, stagger stance and the psoas stretch

For heavy lifts, brace by filling the trunk with air rather than doing a soft belly breath. For curls and overhead triceps work, use a wide staggered stance with your belly button facing forward to train the abs in real-world positions. McGill's psoas stretch: hold a long lunge, raise the arm on the back-leg side with the palm flat to the ceiling and the pinky rotated toward your head, 5–10 seconds per side.

5. Watch your daily posture

The last tool is awareness. Notice rounding while texting, foot position when sitting, and habitual leaning to one side. If you have a posterior bulge, a rolled towel behind your lower back while driving or flying keeps a slight arch. Stop any exercise that makes your pain worse.

Dr. Matt Walker: Using Sleep to Improve Learning, Creativity & Memory | Huberman Lab Guest Series

Guest: Dr. Matt Walker
Date: 2024-04-24 · Duration: 2:28:28
URL: https://www.youtube.com/watch?v=F9KrZd_-ge0

KEYPOINTS

1. You need sleep before learning to absorb new information

In Walker's brain-scanning study, people kept awake all night showed a 40% deficit in forming new memories compared with those who slept. Replications with visual and textbook-style material put the deficit at 20–40%. Animal studies show why: sleep-deprived animals' hippocampus, the brain's short-term memory store, becomes 'stubborn' and won't form new synaptic connections.

2. A nap can refresh your capacity to learn

Two groups learned a large set of facts at noon, then learned a new set at 6 p.m. The group that stayed awake learned progressively worse. The group given a 90-minute nap (enough for a full cycle of non-REM and REM sleep) showed no decline, a difference of about 20%. Sleep spindles, short bursts of activity in non-REM sleep, predicted how much learning ability was restored. Walker compares the hippocampus to a USB stick that sleep empties for new files.

3. You also need sleep after learning to keep memories

Cramming gets material through tomorrow's exam, but a month later almost none of it remains, because without sleep it never moves into long-term storage. Walker's rule is to sleep both the night before and the night after learning something important.

4. Sleep improves physical skills without extra practice

People practiced typing a number sequence (such as 4-1-3-2-4). Twelve hours awake brought no improvement. After a night's sleep the same people were about 20% faster and nearly 37% more accurate. 'Practice with a night of sleep makes perfect.' The gain tracks stage 2 non-REM sleep and its spindles, and naps produce it too, so it's caused by sleep rather than by nighttime.

5. Time learning to your circadian rhythm

There are good learning windows in the morning and again after the post-lunch dip, which usually falls somewhere between 1 and 4 p.m. and lasts 60–90 minutes. Many people get a 'second wind' around 9 p.m. that lasts roughly 45–70 minutes. Walker advises riding it out with dim lights and a calm wind-down rather than taking it as a sign you aren't tired.

6. Short sleep hurts athletic performance and motivation

Under 6 hours of sleep reduces peak muscle output and vertical jump, and time to exhaustion can fall by up to 30%. Perhaps most striking, it lowers the motivation to exercise at all. The relationship works in both directions: daytime exercise deepens sleep that night.

7. Dieting on too little sleep costs muscle instead of fat

When you diet while underslept, you still lose weight, but almost 60% of it can come from lean muscle rather than fat. As Walker puts it, you keep what you want to lose and lose what you want to keep.

8. REM sleep fuels creative connections

In Walker's anagram study, people woken from REM sleep solved about 30% more puzzles than when woken from non-REM sleep, and they solved them in a looser, more intuitive way, with answers seeming to just pop out. Non-REM sleep strengthens individual facts, while REM links distant ideas, which is the overnight alchemy behind 'sleeping on a problem.'

EXAMPLES

1. Later school start, higher scores and fewer crashes

A school district outside Minneapolis moved its start time from 7:25 to 8:30 a.m. The top 10% of students' average SAT score rose from 1,288 to 1,500 the next year. Walker notes some doubt about that source, but consistent data show better grades, fewer mental health problems and less truancy. Car crashes among 16–18-year-olds fell 70%.

2. Sleep-deprived doctors

Residents on 30-hour shifts make about 460% more diagnostic errors in intensive care. Surgeons who have slept under 6 hours in the previous 24 are about 70% more likely to make a surgical error. Driving home after such a shift carries a 168% higher risk of a crash.

3. Sleep paralysis after alcohol

Alcohol suppresses REM sleep, building up a REM 'debt.' Falling asleep afterward can send you straight into REM, and waking before the body's paralysis lifts produces sleep paralysis, mildly stressful to terrifying. A separate problem, REM sleep behavior disorder (acting out dreams), becomes more likely after 50, especially in men.

4. Athletes and extended sleep

In Cheri Mah's Stanford study, basketball players who spent more time in bed improved point scoring and court sprint speed. Walker's lab then confirmed with controlled tests that complex motor skills benefit from sleep as well.

5. Sleepwalking versus acting out dreams

Sleepwalking and sleep talking come from deep non-REM sleep when a partial awakening is triggered. They are different from REM sleep behavior disorder, in which the brainstem's normal paralysis during dreaming breaks down so people physically act out their dreams.

OTHER RELEVANT

1. Protect the first minutes after waking

Because sleep, especially REM, recombines ideas, Huberman tries not to look at his phone for at least 30 minutes after waking. That leaves room for overnight ideas to surface before other people's input crowds them out. He often hurries to write something down while making his morning tea.

2. Beware 'orthosomnia'

Becoming so anxious about getting perfect sleep scores from a tracker that the worry harms your sleep. With pro athletes in the playoffs, Walker collects sleep data but shares it only after the series so it can't undermine confidence.

3. Caffeine may aid memory, but not in place of sleep

Some work suggests caffeine enhances the hippocampus's ability to take in information. No one has tested whether it rescues learning after sleep deprivation, and the sleep-deprived hippocampus may resist the benefit.

4. Edison napped strategically

Thomas Edison is often held up as a short sleeper, yet he napped habitually on his workbench and in his garden, using sleep deliberately as a creative tool. Keep a notebook handy to capture ideas on waking.

LIVE EVENT Q&A: Dr. Andrew Huberman at the Sydney Opera House

Date: 2024-04-19 · Duration: 0:52:53
URL: https://www.youtube.com/watch?v=GA89kjVY6Ik

KEYPOINTS

1. What you believe about stress shapes how your body responds to it
Huberman's top recent stress finding is Alia Crum's mindset work at Stanford. Students who watched a five-minute video on how stress harms the immune system and other systems responded one way; those who watched an equally accurate five-minute video on how stress boosts energy, cognition and memory responded in line with that. The 'stress-is-enhancing' mindset comes from learning true facts, not from lying or placebo.

2. The anterior mid-cingulate cortex seems to grow when you do hard things
Josef Parvizi at Stanford stimulated this region in neurosurgery patients. One said he felt he was 'heading into a storm' but ready to lean in; another felt about to get up and do something really difficult. Studies over the last 3–5 years suggest people who overcome fitness or cognitive challenges show more baseline activity there, and those who fail show less. The benefit appears to generalize, so Huberman urges deliberately seeking psychologically and physically safe challenges alongside comfort.

3. Your perceived 'frame rate' of time depends on where you look and how aroused you are
Close-up focus, like a phone or a watchmaker's bench, and rising autonomic arousal (waiting on a text or an Uber) slice time finely. Looking at distant or unpredictable scenes like clouds, waves or rustling trees widens the time bins. High frame rate suits implementing ideas; lower frame rate and panoramic gaze suit generating them.

4. Chemicals and sound also shift time perception
Psychedelics distort time largely by deploying serotonin, which is tied to clock-perception mechanisms. Caffeine shifts frame rate in the predictable direction, and alcohol and cannabis shift it too, which he notes without recommending them. He suggests 40 Hz tones may help with logical, if-then work by entraining certain circuits.

5. For jet lag, the decisive variable is light relative to your temperature minimum
Your temperature minimum is roughly two hours before your natural wake time (about 4 am if you wake at 6). Bright light to the eyes in the 2–3 hours before it delays your clock by about an hour; light in the 2–3 hours after it advances it. Midday sun is a 'circadian dead zone' for shifting the clock, though good for mood. Afternoon light partially offsets morning light, which is why daily morning sun doesn't make you rise ever earlier.

6. Food, activity and social rhythms help, but light is the 'heavy hammer'
Eating on the local schedule works because food is another zeitgeber (timekeeper). For the first three days in a new place, ask what time your body thinks it is back home. Then seek or avoid light accordingly, using sunglasses and a brimmed hat when you don't want to shift.

7. Psilocybin and MDMA work differently, and Huberman says caution is essential
Psilocybin resembles serotonin, binds a specific serotonin receptor almost selectively and increases resting-state lateral connectivity between brain areas. MDMA (an empathogen) raises serotonin and dopamine, but the serotonergic effect appears to drive most of its therapeutic value. Huberman joined a psilocybin trial and an MDMA trial as an adult and found the psilocybin sessions 'absolutely terrifying' but insightful. He doesn't recommend them outside qualified clinical settings and notes they remain illegal in the US.

8. Their value is feeling and reflecting at the same time
Talk therapy rarely catches an issue at full emotional amplitude. Psychedelics and MDMA let people feel it fully while, with a guide, reflecting and taking notes toward actionable outcomes. He suggests trauma involves unconscious confusion about who was responsible, and MDMA's self-empathy may short-circuit that.

9. Warming up before bed helps you cool down and sleep
To fall asleep, core temperature must drop by about 1–3 degrees. Heating the body's surface with a sauna, hot bath or even warm water on the face and hands prompts the medial preoptic area (the brain's thermostat) to cool the core afterward. He quotes Matt Walker: 'warm up to cool down to fall asleep, stay cool to stay asleep, warm up to wake up.' Cold exposure does the reverse, eventually raising core temperature.

10. Repeated stress usually triggers less adrenaline, unless it matters to you
The amygdala is better seen as a novelty detector than a fear center. A repeating alarm during the show triggered less response each time. Huberman's bet is that a meaningful, worsening stressor, like someone you can't stand who lowers your life satisfaction, would instead escalate the response.

EXAMPLES

1. David Goggins running to the airport
When they first met in 2016 in Silicon Valley, Goggins changed into shorts and ran about 14 miles to the airport with his bags. Huberman uses him, alongside Rick Rubin, as an example of people who simply do what they believe is right.

2. The Abu Dhabi meltdown
On a 12-hour shift from the Bay Area in 2017, Huberman slept well the first night, then barely slept for two days and was 'crying' and 'a wreck', which is why he takes jet lag protocols seriously.

3. The 'LDS MDMA' studies
He cites research on members of the Church of Latter-day Saints, a population that avoids other drugs, who had taken from one to over 100 doses of MDMA. Apart from a mild attention deficit in heavy users, few cognitive deficits and no apparent

neurotoxicity were found. He also notes an older neurotoxicity paper was retracted because subjects had been given methamphetamine. He still warns of possible toxicity with frequent use.

4. Eddie Chang's foot-tap trick

When Huberman's forceps jiggled during retinal microsurgery, the UCSF neurosurgery chair advised tapping a foot. Rhythmic movement elsewhere bleeds off excess anticipatory 'go' activity in the basal ganglia. Huberman tells a leg-bouncing audience member that moving may help them focus too.

5. The friend in the cold plunge

A straight-edge friend went from one minute to three to 45 minutes naked in a cold plunge. Huberman's response: easy does it. Cold and heat are powerful stimuli, so use the minimal effective dose.

OTHER RELEVANT

1. Use red light in the evening

About half an hour before bed, switch to a cheap red party light instead of overhead lighting; Huberman says it is known to reduce cortisol compared with other lighting. He notes Rick Rubin's house uses only red light after sundown.

2. Reset with a low-frame-rate break

Five or six minutes watching an aquarium livestream, clouds or water slows your time perception before you return to high-frame-rate work like typing or texting.

3. Finding your passion (advice to a 17-year-old)

Look back for a remembered 'yum, behold' feeling state from a time you weren't thinking about parents or status. The feeling may not belong to the activity itself. Treat others' feedback only as calibration points pointing back toward that feeling.

Dr. Matt Walker: How to Structure Your Sleep, Use Naps & Time Caffeine | Huberman Lab Guest Series

Guest: Dr. Matt Walker
Date: 2024-04-17 · Duration: 2:18:58
URL: https://www.youtube.com/watch?v=4F_RBc1akC8

KEYPOINTS

1. Humans move from polyphasic to monophasic sleep as they grow up
Infants sleep in many bouts. Sleep starts consolidating at night around ages two to three, kindergarteners are often biphasic (night sleep plus an afternoon nap), and by age five or six most children are monophasic. Newborns spend about 50% of their sleep in REM versus roughly 20% in adults. Walker calls infant REM an 'electrical fertilizer' for building synapses, citing classic animal studies in which REM deprivation stunted brain development.

2. A built-in afternoon dip makes a short siesta biologically natural
Alertness drops between roughly 1 and 4 p.m. (the post-prandial dip), earlier for morning types. Hunter-gatherer groups Walker and others have studied often nap in the hot season, fall asleep about two hours after sundown, and wake just before sunrise, cued by falling temperature rather than light. He doubts the historical 'first sleep, second sleep' pattern is biological.

3. Naps measurably restore learning and emotional balance
In Walker's study, a 90-minute midday nap preserved learning capacity, while the group that stayed awake declined; by 5 p.m. the gap was about 20%. The learning benefit tracked sleep spindles. In a separate study, non-nappers rated fearful and angry faces as more intense by evening, while a nap that included REM sleep blunted those reactions and made happy faces look more positive.

4. The downside of napping is spent sleep pressure
Adenosine builds the longer you're awake, and sleep clears it. A nap releases some of that pressure like a valve on a pressure cooker — 'snacking before the main meal.' Walker's firm advice for people with insomnia is not to nap, which is part of cognitive behavioral therapy for insomnia (CBT-I). Late naps can also make nighttime sleep shallower and harder to return to after waking.

5. About 20 minutes is the sweet spot for a quick boost
Dose-response studies show 5–10 minute naps give a brief bump that fades. From about 15–17 minutes, gains in alertness, concentration and motivation last into the evening. Deep non-REM starts around 30–40 minutes, so longer naps risk sleep inertia (grogginess). They can bring bigger benefits if you accept up to an hour of feeling worse first. Walker's rule of thumb is no naps after about 3 p.m.

6. Daytime napping in older adults may signal poor night sleep rather than cause harm
In large epidemiological studies, napping after about 65 predicts worse health and earlier death. Walker thinks the naps are mostly a proxy for poor night sleep. Deep sleep starts declining in the mid-to-late 30s, is about 50% of teenage levels by 50, and is about 5% by 75, so he is not ready to tell all older adults to stop napping.

7. Caffeine masks adenosine; it doesn't remove it
Caffeine blocks adenosine receptors while adenosine keeps building, so when it wears off you get the original load plus the extra hours' worth: the crash. It also makes the brain more metabolically active, which may produce more adenosine. Walker says only sleep, particularly non-REM, clears adenosine; light, movement and cold override it rather than reducing it.

8. Walker has softened his stance on coffee, with guardrails
Coffee carries strong health signals, which he largely attributes to its antioxidants, since decaf shows many of the same benefits. His limits: no more than about three cups a day, with a cutoff of roughly 8–10 hours before bed for people who aren't sensitive and 14–15 hours (and one cup) for sensitive people. Caffeine sensitivity varies with a known genetic polymorphism affecting clearance.

9. Polyphasic 'biohacker' schedules fail on the evidence
Uberman, Everyman and triphasic schedules trace back to Buckminster Fuller's 'Dymaxion' sleep described in Time magazine in 1943. A Harvard review Walker cites found no support for claimed gains in mood, cognition or productivity. It did find less total sleep, poor sleep efficiency, reduced REM, and impaired judgment, mood and glucose regulation.

EXAMPLES

1. NASA's nap culture
For astronauts seeing 10–20 sunrises a day, short naps produced roughly a 20% boost in alertness and almost 50% in task productivity, according to Walker. The practice spread to NASA's staff on the ground.

2. Why it's called a 'power nap'
David Dinges and Mark Rosekind found that long-haul pilots did best napping early in the flight rather than just before landing. The FAA balked at the term 'prophylactic napping' for a mostly male pilot culture, so 'power nap' was coined.

3. The Japanese nap-stacking study
Five groups: no nap, nap, nap plus caffeine, nap plus cold face and hand washing, and nap plus 2,000-lux bright light. Every addition improved on the nap alone. Caffeine's extra effect was smaller than the nap's own. No group combined everything.

4. Wall Street traders' uppers and downers
Walker's recent study found that traders who leaned heavily on caffeine during the day relied more on alcohol at night to come down, creating a cycle of stimulants and sedatives.

5. Drowsy driving

Walker said sleeping under about six hours raises crash risk by about 30%, with risk climbing exponentially as sleep drops further. He compared it to choosing between two taxis, one 30% likelier to crash — his main warning for polyphasic sleepers.

OTHER RELEVANT

1. The 'nappuccino'

Caffeine takes about 12–17 minutes to reach meaningful blood levels, and early relief from the first sips is partly placebo and the warmth of the drink. Drink a small espresso, nap 20 minutes, and wake as caffeine rises, getting the nap without the grogginess. For the 'nap-plus-plus' version Walker extrapolates (untested as a combo), add cold water on hands and face plus 5–10 minutes of daylight.

2. Make a nap easier to fall into

If you're not a natural napper you don't have to start. If you want to, mimic night: darkness or an eye mask, earplugs, shoes off, lie down under a blanket (lying flat helps the core body temperature drop), and set an alarm.

3. Test changes with an on-off-on design

If late naps seem to hurt your sleep, move them earlier, such as just after lunch, for about two weeks. Then return to the old schedule. Walker is more convinced if things get worse when you stop than if they improved when you started.

4. Check whether coffee is hiding poor sleep

Huberman's suggestion to delay caffeine 90–120 minutes may blunt the afternoon crash. Walker endorses testing it and adds a deeper check: after two weeks of caffeine withdrawal, take your first coffee at about 11 a.m. If you aren't sharp by about 9 a.m. without it, look at your sleep.

How to Master Growth Mindset to Improve Performance | Dr. David Yeager

Guest: Dr. David Yeager
Date: 2024-04-15 · Duration: 2:26:10
URL: https://www.youtube.com/watch?v=etEJrznE-c0

KEYPOINTS

1. Growth mindset means abilities can change, not that effort guarantees anything
Yeager defines growth mindset simply as the belief that your abilities or potential in a domain can change, crediting Carol Dweck as its originator. A common confusion is that it means 'try hard and you can do anything.' In a fixed mindset, a mistake threatens to label you for life, so the goal becomes hiding deficiencies. In a growth mindset, mistakes are part of the process.

2. The core mechanism is remediation instead of defensiveness
Yeager's favorite mechanism study is an underappreciated one by David Nussbaum and Dweck (details below). Everyone tries to recover self-esteem after failure. Fixed-mindset people do it by looking down at those who did worse; growth-mindset people look up at those who did better to learn their strategies.

3. Effective 'wise interventions' share three ingredients
Greg Walton's umbrella term covers growth mindset and related short programs. Each one presents non-obvious scientific information and offers stories from relatable peers, which researchers call descriptive norms (e.g., older students who once felt 'dumb'). Each then has participants write their own story of a struggle in which the idea helped, known as 'saying is believing.' Delivery matters: people must not feel talked down to, condescended to or ashamed.

4. Short interventions work by changing lay theories that snowball
People carry intuitive 'lay theories' about what effort or failure means. Change the theory and you change the meaning someone makes of future events, and therefore how they respond. Stories are 'theories in motion.' Delivered at the right moment, a new meaning can start a recursive snowball of better choices that compounds over months or years.

5. Distinguish the stressor, the appraisal and the response
A stressor is any demand, from an exam to a hard conversation to a marathon. Your appraisal is whether you think your resources can meet it. A threat response, triggered when demands seem to exceed resources, prepares the body for damage. Blood stays central and cortisol rises for tissue repair, a holdover from physical fights. For teens, many social stressors feel like threats of 'social death.'

6. Arousal itself is not the problem
Measures such as pre-ejection period (a sympathetic marker) or skin conductance, and consumer wearables, cannot tell a positive challenge state from threat. Both involve high arousal. Jeremy Jamieson's example: an expert and a novice at the top of a double-black-diamond ski run are both amped. One is stoked; the other is imagining a crash. Performance depends on pairing demand with a belief that you have the resources to meet it.

7. 'Stress-is-enhancing' beliefs change physiology
Building on Alia Crum, Jeremy Jamieson and Wendy Mendes, Yeager's team combined growth mindset with reappraising stress as a resource. A racing heart can be read as delivering oxygenated blood to brain and muscles. In their studies this reframing changed stress physiology itself. Yeager notes that stress-management memes ('drink chamomile tea') imply stress must be escaped, when sometimes you should 'get ready to kick ass.'

8. Be a mentor, not an enforcer or protector
Enforcers hold high standards with no support ('look to your left, look to your right'); protectors care but lower standards to spare you stress. Mentors combine high standards with high support, which makes growth mindset feel real because others are pushing you to grow. Huberman cites Randy Pausch: worry when mentors stop pushing you.

9. Adolescents strive for status and respect, not laziness
Puberty sharpens sensitivity to social hierarchy because being cast out once meant death. Testosterone-linked changes support obsessive practice: songbirds lacking testosterone while learning mating calls don't practice obsessively and fail to master them. Teens train at 4 a.m. for the Olympics even as adults call them lazy. Schools with many routes to status reduce cruelty.

10. Purpose works best when paired with self-interest
Adding a prosocial 'contribute to others' reason for schoolwork had a big effect, but only when combined with plausible personal benefits like skills, an enjoyable job and freedom. Pure self-transcendence without self-interest tended not to motivate.

EXAMPLES

1. 2019 Nature national study
With Dweck, Walton, Angela Duckworth and others, two sessions of about 25 minutes each for ninth graders raised the odds of good grades 8–9 months later and of taking harder math in 10th grade. Unpublished data show effects on graduating with college-ready courses four years later. Safeguards included third-party data processing, a random sample of schools, and pre-registered analyses.

2. Looking up versus looking down after failure
In the Nussbaum and Dweck study, undergraduates scored just 20–30% on a task. Before retrying, fixed-mindset participants compared themselves with people scoring about 12%. Growth-mindset participants studied people scoring 85–90% to learn their strategies. Both groups recovered self-esteem similarly.

3. Wise feedback roughly doubles revisions

In work building on Geoffrey Cohen and Claude Steele, critical comments framed with high standards plus an assurance that the student could meet them made seventh graders about twice as likely to act on essay feedback. Yeager stresses that 'it's not magic': the power is being taken seriously when you are vulnerable, not the roughly 18 words.

4. The 'save the world speech' for tedious research

Rather than promising undergraduate research assistants law-school admission, Yeager explains that their painstaking coding will help thousands measure more accurately. He also warns that skeptics, including on PubPeer, will scrutinize every file, so every processing step must be documented.

5. Popularity and bullying

Sociologist Bob Faris found the most bullying comes from students near but not at the top of popularity. Huberman links this to Robert Sapolsky's primate work on stressed alphas and sub-alphas.

OTHER RELEVANT

1. Pair challenge with a stress reappraisal

When you load your plate with hard goals, expect a racing heart and sweaty palms, and tell yourself the response is fueling performance rather than signaling danger.

2. Give critique the mentor way

State the high standard explicitly and pair it with confidence and support, like a roller-coaster height sign that adds 'I believe you can reach this.'

3. After a setback, look up, not down

Ask what the top performers are doing differently instead of reassuring yourself with those who did worse.

4. Give teens respect and meaningful routes to status

Offer high standards, real contribution and many ways to be valued, rather than lectures or condescension.

Overcoming Physical & Emotional Challenges | Coleman Ruiz

Guest: Coleman Ruiz
Date: 2024-04-08 · Duration: 3:18:02
URL: https://www.youtube.com/watch?v=acgz0C-z-gc

KEYPOINTS

1. Wrestling was the first turning point
Ruiz grew up in New Orleans, the son of a father who had wrestled, and says he knew within a week, maybe at his first practice, that wrestling was his thing. He also boxed between seasons. What he valued most in combat sports was the respect: fighters understand what it takes to face someone on a mat with no equipment, nowhere to run and no timeouts. The love of hard physical effort has stayed with him.

2. Earning your place daily works, until it doesn't
At the Naval Academy prep school in Newport, Rhode Island, and later, Ruiz never felt he had arrived. Each day was a restart where he had to prove himself again, driven largely by fear. He calls this adaptive in that it made him go all in for his team, but also maladaptive: after loss, his response was simply to work even harder.

3. Three backgrounds predicted who survived BUD/S
As a first-phase officer in charge, the phase that runs Hell Week (five nights with barely an hour of sleep, where most quitters ring the bell before Wednesday), Ruiz says instructors found that pull-ups, run times and home region didn't predict success. Their informal survey found that roughly 90–95% of those who made it had been varsity athletes, had divorced parents or had been suspended from school. He stresses this was anecdotal and would not pass independent review.

4. Having no other team can make someone refuse to quit
Asked why divorce would predict grit, Ruiz says that for him the thought was 'if I don't have this team, then what team do I have?' However cold and miserable it got, he wasn't leaving. Huberman relates to looking outside the household for family and belonging.

5. Repeated loss was absorbed rather than processed
Serving at a Tier One unit from 2006 to 2011, Ruiz lost well over 40 people he knew. Averaged out, he attended a funeral or memorial about every 90 days. The routine was a funeral, a few beers, then back to work. His closest mentor, a Marine named Doug whose toughness he had never seen equalled, was killed in 2007. Ruiz describes taking the call in his kitchen in Virginia Beach and feeling 'the whole scaffolding of the world' disappear.

6. Leaving the military was the hardest part of the journey
After separating in fall 2011, Ruiz had night sweats and no idea what to do with himself. He had thought PTSD 'the biggest joke on the planet' until he read the symptoms. Joseph Campbell's The Hero with a Thousand Faces gave him a framework: he felt trapped in the return stages, especially the 'refusal of the return', without a mentor to help him cross the threshold back into ordinary life.

7. An intense psychedelic experience was followed by collapse
Ruiz describes physician-supervised, legal sessions of ibogaine and 5-MeO-DMT two days apart, one of the most profound experiences of his life, which left him feeling connected to all warrior cultures. A few months later he fell into severe depression. He now calls that combination 'the nuclear option' and says it isn't right for everyone. When friends ask, he initially tells them no, and he favours slow, skilled talk therapy first.

8. Emotional pain can be physically overwhelming
The depression shocked him most because he had not believed something like it was real. He couldn't believe emotional pain could be so physically painful, and says he came close to the line of suicide. Looking back, he likens those months to being cut open, scorched from the inside and put back together to start over. Huberman, drawing on psychiatrist Paul Conti, notes that the limbic system's dread doesn't know the clock or the calendar, so it feels like it will last forever.

9. Recovery came in small steps
His wife Bridget insisted on full-time help immediately, and he admits he would otherwise have avoided it. Gains were minuscule but steady. He stopped drinking easily during that period. Huberman shares that he took low-dose bupropion for about four months during a postdoc depression and adds, after Conti, that many such medications are designed to help people get over a bump, though some people need them long term.

EXAMPLES

1. 'Your goggles are foggy'
When Ruiz called in crisis, Huberman told him his judgement was clouded, so he should outsource his decisions, and even his identity, to trusted people for a while, letting them hold 'the spokes of the wheel'. Ruiz found that something he could actually do.

2. A tough-love line from a teammate
One friend told him that harming himself would prove everything he had stood for was a lie. Ruiz says it hit 'dead center' and became a pivot. He cautions that tough love is risky and should only be used with someone who can handle it, and Huberman adds that anyone with a plan needs protection.

3. A warning from a Medal of Honor recipient
At a lunch in 2011, Vietnam veteran Paul 'Buddy' Bucha stopped him on the stairs and said, 'Son, you have it… and you're going to have to deal with it.' Ruiz dismissed it at the time and only later understood.

4. Bodywork as an entry point

Before therapy, Ruiz tried light-touch craniosacral work, massage, books by Sam Harris and a course with Robert Wright. They helped somewhat but weren't consistent help on their own.

OTHER RELEVANT

1. His routine now

Training five of seven days (cycling, running, swimming, lots of kettlebells), at least an hour of sauna on the other two, strict attention to sleep, no alcohol and small meals grazed through the day.

2. Range instead of rigid toughness

Borrowing David Epstein's term, he says men can keep a protective fighter mode while adding kindness and calm, and that loosening his grip, including on his three sons, has made things go better.

3. Asking for help

Both stress that zero-cost support exists through friends, clergy and groups like AA, and Ruiz describes the hours friends spent on the phone with him as essential.

Dr. Matt Walker: The Biology of Sleep & Your Unique Sleep Needs | Huberman Lab Guest Series

Guest: Dr. Matt Walker
Date: 2024-04-03 · Duration: 2:59:33
URL: https://www.youtube.com/watch?v=-OBCwiPPfEU

KEYPOINTS

1. Sleep is two types that trade dominance across the night
Non-REM is split into stages 1–4 (1–2 light, 3–4 deep), and REM is the main dreaming stage. They alternate in cycles of roughly 90 minutes, but the ratio shifts: early cycles are dominated by deep non-REM, later cycles by REM.

2. The '90-minute cycle' is an average, not a rule to set alarms by
Individual cycles range from about 75 to 120 minutes, are fairly stable within a person, and men's average cycle runs roughly 15–20 minutes longer than women's. Asked whether you should cut sleep short to wake at the end of a cycle, Walker's answer was simply 'false': sleep as much as you can and be wary of devices that wake you on a supposed 90-minute schedule.

3. Stage 2 is marked by sleep spindles; deep sleep by huge, synchronized slow waves
Spindles are 1–2 second bursts at 12–15 Hz while background activity slows to about 4–8 Hz. In stages 3–4 the brain oscillates only 1–2 times per second, with waves several to ten times larger than waking activity, because hundreds of thousands of cortical neurons fire and fall silent together.

4. Deep sleep calms the body and restocks the immune system
Walker's lab reported that the coordination of slow waves and spindles signals the autonomic nervous system to shift into a parasympathetic state; heart rate and blood pressure fall. Deep sleep also restocks immune cells such as T cells and natural killer cells and increases the body's sensitivity to immune signals.

5. Losing deep sleep alone impairs blood-sugar control from both sides
Using quiet tones just below the waking threshold, researchers can strip out deep sleep while total sleep stays around eight hours. The pancreas then releases less insulin, and cells respond less to the insulin that is released. Deep sleep also helps shift memories into long-term storage and is when the brain clears beta-amyloid and tau, two proteins central to Alzheimer's disease.

6. You must lose about 1°C of core temperature to fall and stay asleep
That is why a too-cold room is easier than a too-hot one. The body sheds core heat by pushing blood to the skin's surface, and it does this best when lying flat. That is one reason reclined sleep is lower in quality.

7. Good sleep has four 'macros': quantity, quality, regularity and timing (QQRT)
Quantity is 7–9 hours for the average adult (the CDC's minimum is 7); Walker quips that most people need about 90 minutes more than they get. Quality includes continuity, measured as sleep efficiency (time asleep ÷ time in bed), where 85% or higher counts as healthy, and the electrical strength of deep sleep, which consumer trackers can't measure. He insists you can't trade off quantity against quality.

8. Regularity may predict mortality even more strongly than duration
Walker defines regularity as consistent lights-out and wake times, within about ±30 minutes, measured from lights out rather than from getting into bed. It is the newest macro to prove its importance (see the UK Biobank analysis below).

9. Chronotype is largely genetic, and fighting it shortens sleep
Sleep science uses five types: extreme morning (about 8 pm to 4–4:30 am), morning (about 9:30 pm to 5:30 am), neutral (about 11 pm to 7:30 am, Walker's own type), evening (about 12:30 am to 9:30 am) and extreme evening (2:30–3 am onward). At least 22 genes shape it. A morning type kept up until midnight still wakes around 4:30 am as their circadian rhythm rises, so they end up short on sleep, which Walker argues makes society's bias against night owls unfair.

10. Sleep pressure, growth hormone and cortisol are all tied to sleep timing
Adenosine builds up as a by-product of brain metabolism, damping wake-promoting regions and boosting sleep-promoting ones; deep sleep lets clearance outpace buildup. Growth hormone release depends on both sleep and night-time: blocking deep sleep cuts it, and day-sleeping shift workers release some but less. Cortisol falls steeply as you get sleepy and climbs toward natural waking.

EXAMPLES

1. Waking two hours early can cost 60–80% of REM
Walker's example is someone who usually sleeps midnight to 8 am but gets up at 6 am. They lose 25% of total sleep, but because REM is concentrated late in the night, perhaps 60–80% of their REM.

2. One night of four hours cut natural killer cell activity by 70%
Walker cites Michael Irwin's UCLA study of healthy adults. Short sleep the week before a flu shot can halve the antibody response.

3. Sleep restriction rapidly ages hormones and blood sugar
Healthy young men limited to four to five hours a night for five nights had testosterone levels typical of men about ten years older; women show disrupted estrogen, FSH and LH. Five hours a night for four nights can push healthy people's glucose handling into the pre-diabetic range. Walker admits the full dose-response curve hasn't been mapped.

4. Daylight saving time as a natural experiment

Losing an hour in spring was linked to a 24% relative rise in heart attacks the next day, and gaining one in autumn to a 21% drop. Walker concedes the effect sizes are debated, but car accidents, suicides and the harshness of judges' sentences also rise after the spring change.

5. UK Biobank: regular sleepers had 49% lower all-cause mortality

In roughly 60,000 people, the most regular quartile showed about 35% lower cancer mortality and close to 60% lower cardiovascular mortality than the least regular. Regularity carried almost twice the predictive weight of sleep duration.

6. Six hours a night for a week altered 711 genes

In Derk-Jan Dijk's study at the University of Surrey, about half the affected genes, mostly immune-related, were turned down. The other half, linked to tumor promotion, chronic inflammation and cellular stress, were turned up.

OTHER RELEVANT

1. Use a roughly 25-minute rule for lying awake

If you can't fall back asleep after about 20–25 minutes, and this happens often, get up and read or listen to something in another room, then return only when sleepy. This is a core idea in cognitive behavioral therapy for insomnia (CBT-I): 'you would never sit at the dinner table waiting to get hungry.' If you still feel you have sleep left in you and your schedule allows it, it's worth trying to get it back this way.

2. Simple self-checks for insufficient sleep

Would you sleep past your alarm if it didn't go off? Do you have lapses, such as not remembering whether a light was red? Can you function well without caffeine before 11 am? Feeling unrefreshed after a 'good' tracker score points to a quality problem. Walker stresses that sleep-deprived people consistently underestimate their own impairment.

3. Use a bedtime alarm as well as a wake alarm, and find your chronotype

Walker uses both alarms to stay regular. To estimate your chronotype, take the free Morningness-Eveningness Questionnaire (search 'chronotype MEQ'), or ask what schedule you'd keep alone on a desert island with no obligations.

4. For snoring or apnea, avoid sleeping on your back

Lying on your back lets gravity collapse the airway. The old clinic trick is a tight T-shirt worn backwards with a tennis ball in the pocket.

5. Protect your evenings from stress

Because cortisol should be dropping at night, stressful news, arguments or work after about 8 pm can disrupt the whole night. This is the 'tired but wired' state often seen in insomnia.

How Placebo Effects Work to Change Our Biology & Psychology

Date: 2024-03-04 · Duration: 1:18:16
URL: https://www.youtube.com/watch?v=gdUNjPijwA8

KEYPOINTS

1. Placebo, nocebo and belief effects are distinct but share one engine: expectation
A placebo is an inert pill or behavioral treatment that improves symptoms or performance; a nocebo is an inert treatment that makes them worse. Belief effects occur when specific information you learn changes what you expect, and that expectation produces the outcome. Huberman stresses that none of these are 'just in your head': they change heart rate, blood pressure, hormone output and neuromodulators like dopamine and adrenaline.

2. The prefrontal cortex is the hub that turns expectation into physiology
The prefrontal cortex evaluates context, memories and goals, and largely works by activating or suppressing deeper circuits. Some of its subregions have dedicated 'labeled line' connections to the hypothalamus and brainstem, which control ancient functions such as stress responses, body temperature and breathing. That anatomy is why what you are told about a pill can reach systems you cannot consciously command.

3. A sugar pill can cause measurable dopamine release in Parkinson's patients
In placebo-controlled Parkinson's trials, people told an inert pill would raise dopamine showed symptom improvements and PET imaging evidence of more dopamine release, seen as reduced binding of the tracer raclopride at dopamine receptors. Two caveats keep this from replacing real drugs: placebo-driven dopamine increases are generally smaller than those from L-DOPA, apomorphine or bromocriptine, and the effect shrinks when people realize they are taking a placebo.

4. Placebo responses can be conditioned, not just suggested
Pairing a context with a real physiological effect teaches the body to reproduce that effect. Smells from a bakery or pizza shop raise insulin because of past eating experiences, and in experiments a bell or buzzer paired with food later triggered an insulin rise on its own. Huberman frames this as the brain lumping environmental cues together and making simplified predictions below awareness.

5. Packaging, color and invasiveness change the size of a placebo effect
Brand-name placebos (even invented names with a trademark symbol) outperform generic ones, and pills pushed out of foil or taken from labeled bottles beat pills set on a tray. Capsules beat tablets, injections beat capsules, and inert medical machines that hum and click produce the largest effects. The brain has learned to equate complexity and invasiveness with bigger outcomes.

6. Placebo effects are powerful but specific and limited
In cancer care, placebos can reduce pain, nausea and other side effects of chemotherapy or radiation, improving well-being, but they do not shrink or eliminate tumors. Huberman separates three categories: proven behavioral supports such as sleep, stress reduction and social support, which act by lowering inflammation and stress hormones; real treatments such as drugs, radiation and immunotherapy; and genuine expectation effects, which have limits.

7. Expectation scales with the dose you think you received
In the study 'Nicotine-related beliefs induce dose-dependent responses in the human brain,' everyone vaped the same real dose of nicotine but was told it was low, medium or high. Cognitive task performance and activity in a nicotine-responsive brain region both rose stepwise with the believed dose. Huberman calls it one of his favorite papers because it ties belief, brain activity and performance together.

8. There is a mapped circuit from thought to the stress response
A rat study titled 'A central master driver of psychosocial stress responses' traced a prefrontal region (the dorsal peduncular cortex and dorsal tenia tecta) to the dorsomedial hypothalamus, then to the rostral medullary raphe in the brainstem, and out to the body. This pathway drives blood pressure, peripheral vasoconstriction, body temperature and brown-fat thermogenesis during social stress. Huberman notes analogous circuitry exists in humans. By contrast, no known pathway lets belief grow one quadriceps more than the other.

9. People differ in how strongly they respond to placebos, partly through genes
The first formal placebo study found roughly 30% of participants showed a robust effect and 70% a weaker one, and that spread has recurred across studies. Variation in the COMT gene, which encodes catechol-O-methyltransferase, an enzyme that regulates dopamine, epinephrine and norepinephrine, correlates with the strength of some placebo responses. That fits the fact that many placebo effects involve catecholamine systems.

EXAMPLES

1. Saline injections that mimicked sumatriptan's hormone effects
Subjects learned about growth hormone and cortisol, which alone changed nothing. On days two and three they were injected with sumatriptan, which raised growth hormone and lowered cortisol. On a later day a saline injection produced the same pattern, even when subjects were told it would lower growth hormone. The brain had paired 'injection' with the hormonal outcome.

2. Pill color steers the direction of the effect
Across three separate experiments with identical placebo pills, blue pills produced the best sleep when the pills were described as sleep aids, red pills the biggest boost when described as stimulants, and yellow pills the greatest relief when described as antidepressants.

3. Kaptchuk lab asthma study in the New England Journal of Medicine

Ted Kaptchuk's group at Harvard briefly took asthma patients off medication and gave them no treatment, a placebo, or an active drug. The active drug improved both breathing and discomfort. The placebo reduced reported discomfort, but measured breathing did not change, which shows how specific placebo effects are.

4. Alia Crum's 'Mind Over Milkshakes'

People drank the same 380-calorie shake labeled either as a 620-calorie 'indulgent' shake or a 140-calorie 'sensible' one. Ghrelin, a hunger hormone secreted by the stomach, was measured at baseline, in anticipation and 90 minutes after drinking. It fell more steeply and quickly after the 'indulgent' label, and people felt fuller.

5. Hotel room attendants told their work was exercise

Crum's adviser suggested the benefits of exercise might be placebo. She split hotel housekeepers into a group told their job was important and a group told their daily vacuuming, stair-climbing and cart-pushing counted as exercise that lowers blood pressure and body weight. Only the second group showed improvements in blood pressure, heart rate and body weight.

OTHER RELEVANT

1. Pair real treatments with accurate, specific expectations

Because expectation adds to the effects of active drugs and protocols, learning what a legitimate treatment is meant to do may amplify its benefit. Some researchers, including Kaptchuk, argue placebo effects should be harnessed as treatments in their own right.

2. Do not expect belief to cure structural disease

Mind-body practices that lower stress and improve sleep can support cancer outcomes through known biology, but expectation alone does not shrink tumors or restore airway function. Use beliefs to ease discomfort, not to replace effective medicine.

3. Watch the mindset you bring to food and movement

The milkshake and housekeeper studies suggest that viewing food as satisfying and daily activity as real exercise can shift hunger hormones and health markers. These are low-cost changes in framing worth applying on purpose.

4. Read this as an argument for better trial design

Placebo controls exist because expectation strength varies between people and contexts. When judging a supplement or drug claim, ask whether it beat a well-designed placebo rather than relying on how it felt.

Protocols for Excellent Parenting & Improving Relationships of All Kinds | Dr. Becky Kennedy

Guest: Dr. Becky Kennedy
Date: 2024-02-26 · Duration: 2:54:02
URL: https://www.youtube.com/watch?v=XT_6Lvkhxvo

KEYPOINTS

1. 'Sturdiness' means staying connected to yourself and someone else at once
Kennedy, a clinical psychologist and founder of Good Inside, defines sturdy leadership as knowing your own values, wants and needs while staying connected to another person whose needs differ. She says this applies to partners, coworkers and friends as much as to children.

2. Parents have two jobs: boundaries and empathy
Most parents, she says, couldn't tell you their job description when a child hits, lies or melts down. Hers has two parts. Boundaries keep you connected to yourself and keep kids safe. Empathy and validation mean treating a child's feelings as real without condoning the behavior. The two are partners: rules without relationship breed rebellion, while empathy without boundaries leaves kids feeling unsafe.

3. A boundary is what you will do, not a request
A boundary requires nothing of the other person. 'Turn off the TV' is a request. 'If it's not off by the time I get there, I'll take the remote and turn it off' is a boundary. Applied to an intrusive in-law: 'Next time you come unannounced, I'll meet you at your car and say this time doesn't work.' Many 'my kid doesn't listen' problems, she argues, come from not setting a boundary early or firmly enough, which leaves kids to do the parent's job.

4. Kids are good inside; bad behavior signals a missing skill
When Kennedy stripped away every parenting assumption, she was left with one: kids are inherently good. They are born with every feeling and none of the skills to manage them, so behavior is feeling without skill. Punishing it is like trying to teach swimming by punishing a child for not swimming. While trained in a reward-and-timeout program, she once told a client mid-session, 'I don't believe anything I've been telling you.'

5. Rewards can crowd out a child's wish to contribute
Kennedy says children, like adults, want to be a purposeful part of the group. Paying for basics leads to teenagers who won't pick up clothes without $5. Instead, she says 'we're on the same team', assumes the most generous interpretation, and asks what would help the child remember.

6. 'I believe you' builds confidence
When a child says they were picked last, replying 'it's no big deal' teaches them that others know their feelings better than they do. Kennedy's go-to sequence is: 'I'm so glad you're talking to me about this. I believe you. Tell me more.' It signals that the child's experience is real and that their big feelings don't overwhelm you. She says it works with spouses and colleagues too.

7. Trauma is what happens when pain is processed alone
Echoing Gabor Maté, Kennedy says trauma is 'what happens inside you', not the event itself. Citing Ronald Fairbairn's line that a child would rather be a sinner in a world ruled by God than live in one ruled by the devil, she explains that a child yelled at by a caregiver, then left alone, resolves it through self-blame or self-doubt. Many adults carry those patterns. The same event processed with a caring adult is very different.

8. Repair starts with yourself
Before repairing with a child, separate your identity from your behavior. Kennedy repeats 'I'm a good parent who is having a hard time' until something shifts. Without that step, apologies become a bid for the child's reassurance. A repair is something you give, not something you get, and it can be a note slipped under the door if face-to-face is too hard.

9. A sturdy leader is like a pilot
Families can end up 'walking on eggshells' around intense kids, giving in to avoid outbursts. A pilot who changes an emergency landing because a passenger is angry frightens everyone. Kennedy's 'deeply feeling kids' have huge, sometimes animalistic tantrums. They are tenacious and free of people-pleasing, but need firm boundaries to avoid becoming tyrants.

EXAMPLES

1. A simple apology script
'I'm sorry I yelled. It's never your fault when I yell. Like you, I'm working on managing my feelings, and next time I'll try to stay calm.' Even just 'I'm sorry I yelled' confirms that what the child experienced really happened.

2. 'I hate you'
Kennedy often does nothing in the moment rather than return the energy. Later she asks for the most generous interpretation, such as intense disappointment over a cancelled play date. Outside the moment she rehearses the skill, aiming for 'Oh man, I was really looking forward to that.'

3. The towel on the floor
Rather than paying her son, Kennedy asked what would help him remember. He wrote his own Post-it reminder for his door, and he now picks up his towel far more often.

4. The note a teen rips up
A teen client screamed 'get out', slammed the door, then opened it minutes later and was hurt that her parents weren't there.

Kennedy tells parents to leave a note anyway, such as 'That was tough. You're a good kid and I love you', even if they hear it torn up. Teens need a home base; without one they become nomads rather than explorers.

5. Inserting frustration on purpose

Kennedy suggests bringing kids on boring errands, making them fold laundry even with paid help, and letting them sit with not making a team for a couple of days. Some reading struggles that test negative for dyslexia, she suspects, are a child's first experience of sustained effort without instant success. Learning happens in the frustrating space between not knowing and knowing.

OTHER RELEVANT

1. Expect to grieve during adolescence

Teens must overcorrect away from parents to form their own identity, and parents genuinely lose closeness. Naming that sadness keeps it from turning into anger at the child.

2. Understand before you intervene

Kennedy's most underused tool is doing nothing in the heat of the moment, then figuring out what skill was missing.

3. Grace over perfection

Kennedy, a self-described pragmatist whose own kids have iPads, says no one has 'messed up their kid forever'. Small changes at the margin are what count.

How to Optimize Cognitive Function & Brain Health | Dr. Mark D'Esposito

Guest: Dr. Mark D'Esposito
Date: 2024-02-19 · Duration: 2:32:37
URL: https://www.youtube.com/watch?v=HYVeP4F0GNU

KEYPOINTS

1. The prefrontal cortex is the brain's CEO, and it's the first system to falter
D'Esposito, a neurologist, defines executive function or 'cognitive control' as the ability to plan, organize and turn goals into actions rather than being ruled by automatic behavior. The frontal lobe has perhaps 25 subregions, with the lateral portion central to executive function. Sleep deprivation, stress and normal aging hit this system first, which is why everything feels harder on a bad day. He notes that insurers' age-25 cutoff roughly tracks when frontal lobes finish maturing.

2. Working memory is active manipulation, not passive storage
Working memory is holding information in mind while doing something with it, like a math problem or planning a sentence, and it's the foundation of executive function. Neurons in the frontal lobes keep firing persistently while information is held. D'Esposito explains that dopamine acts as a modulator that keeps this persistent activity stable. Deplete dopamine and working memory drops significantly, and replace it and performance recovers.

3. Dopamine and working memory follow an inverted U
In D'Esposito's studies, people with a low working-memory span (holding about five or six letters) improved on bromocriptine, a dopamine agonist, while people with a high span got worse. PET scans showed span correlates strongly with frontal dopamine, so a simple span task can serve as a rough behavioral proxy for baseline dopamine. 'More is just not better,' he says. The goal is to bring people to their optimal level.

4. Genetics sets your dopamine baseline
The enzyme COMT breaks down dopamine in the prefrontal cortex. D'Esposito estimates that in roughly 25% of people it's overactive and in another 25% underactive, though this varies by ancestry, so about half the population sits off-center. Knowing your COMT status and span may eventually help predict who benefits from boosting dopamine and who would be harmed.

5. Healthy volunteers can't tell when bromocriptine is helping
Bromocriptine is short-acting (about four to six hours) and kicks in roughly 90 minutes after dosing. D'Esposito says healthy subjects on low doses can't distinguish it from placebo and don't feel 'buzzed.' They only learn their working memory improved when shown the data, and the gains reflect better performance, not just speed. He's disappointed that drug companies, focused on disease markets, never took up cognitive optimization with these already-approved drugs. Huberman stresses he is not encouraging anyone to take it.

6. Norepinephrine is another lever, and combinations may matter
Anything that boosts norepinephrine seems to help executive function. Guanfacine, a blood-pressure drug, is the most used, and D'Esposito says a study found it improved COVID brain fog, with trials now under way. Neuromodulators interact: in one example, low doses of two drugs were effective together when neither worked alone. On stimulants like Adderall, Vyvanse and Ritalin, he says decisions belong with a psychiatrist, and he cites the 1980s Wall Street cocaine culture as proof that 'more is better' fails.

7. Concussion recovery: protect sleep, move as tolerated, retrain skills
Almost every concussion patient reports poor sleep, which compounds deficits, and a large share still feel mentally foggy, light-sensitive or dizzy a year out. Advice has shifted from dark-room rest to activity as tolerated without worsening headache or light sensitivity. Patients who feel fine after a couple of weeks off often find their first day back at work a disaster, so D'Esposito favors a graded return. Goal management training helps but isn't covered by insurance, so '99%' of his patients get no intervention. He points to online training like BrainHQ as a scalable option.

8. Estrogen modulates frontal dopamine
The frontal lobes may hold more estrogen receptors than any other brain region, and estrogen boosts dopamine. In a study by a colleague, Berkeley undergraduates were tested at low- and high-estrogen points of the menstrual cycle and genotyped for COMT. Frontal function and working memory dipped at low estrogen, especially in those with low baseline dopamine. This fits anecdotal reports of working-memory gains in postmenopausal women on estrogen.

9. Aerobic exercise and mindfulness train executive function directly
Arthur Kramer's group at the University of Illinois found aerobic exercise as effective as cognitive therapy for improving executive function. D'Esposito frames mindfulness (focusing on the breath, noticing when focus drifts and returning) as focus training, since losing focus is 'half the problem' with not reaching goals. In his studies, the specific style didn't seem to matter.

EXAMPLES

1. Bromocriptine before the Olympics
D'Esposito says sprinters once took bromocriptine before the Olympics, when it wasn't on the banned list, because faster reaction times worth hundreds of milliseconds can decide the podium. He thinks it's banned now.

2. Nicotine and Alzheimer's
Asked about nicotine as a neuroprotectant, D'Esposito knows of no evidence that it prevents neurodegeneration. It was used in early Alzheimer's studies because of its effect on the cholinergic system, which is impaired in the disease. Families of patients on cholinesterase inhibitors sometimes report better memory, but the disease course isn't slowed. Huberman adds that nicotine raises blood pressure and that smoking, vaping and dipping are harmful.

3. No checkup measures your brain

D'Esposito notes that routine physicals check blood, heart and skin but never cognition, because the field hasn't given doctors a simple brain-health test. He hopes brain fitness will 'take off the way physical fitness did.'

4. Smartphones versus working memory

Both agree the modern world, with its texts interrupting conversations and constant notifications, is built to disrupt frontal-lobe working memory. They say it needs deliberate training, the way muscles and cardiovascular fitness atrophy without exercise.

OTHER RELEVANT

1. Protect the basics first

Sleep, stress management, nutrition and aerobic exercise are the core tools D'Esposito and his neurology colleagues now use to optimize the frontal lobes, a conversation he says wouldn't have happened 30 years ago.

2. Train working memory with demanding activities

Games and skills that require holding information in mind, like chess (which Huberman resolves to learn) or a new skill learned step by step, exercise the same circuits.

3. Treat cognitive drugs as optimization, under supervision

Because of the inverted U, a drug that helps a low-baseline person can impair a high-baseline one. Stimulant and off-label use decisions belong with a psychiatrist or physician.

4. After a concussion, ramp up gradually

Fix sleep, stay as active as symptoms allow, and rebuild work and cognitive demands step by step rather than returning at full speed.

The Biology of Social Interactions & Emotions | Dr. Kay Tye

Guest: Dr. Kay Tye
Date: 2024-02-05 · Duration: 2:31:06
URL: https://www.youtube.com/watch?v=V0Sdgn0_kFM

KEYPOINTS

1. The amygdala does far more than fear
Tye, a Salk Institute neuroscientist and HHMI investigator, notes that the early Klüver-Bucy lesion studies left monkeys emotionally flat toward everything: food, feces, objects. Fear dominated research because it was easy to study. As a graduate student working on the basolateral amygdala, she showed its neurons strengthen their synapses and fire to cues that predict reward, which surprised the field when she presented it at the first Gordon Research Conference on the amygdala.

2. Valence is assigned at a fork in the road
Valence means net good versus net bad, which Tye distinguishes from value, a scale of magnitude in one direction. Her lab traced amygdala projections and found separate populations sending mostly positive or mostly negative signals to different downstream targets, which drive approach or avoidance. At the time it was hard to publish because few thought neurons in one region could have completely different functions depending on where they project.

3. Novelty gets a single chance to matter
The amygdala responds to anything new, like an unfamiliar tone or a fire alarm, then quickly stops responding if it predicts nothing. Tye calls this giving everything novel a chance to prove its importance in one trial. It's why someone else's ringtone startles her when her own phone is on do-not-disturb, while its owner barely notices it.

4. The amygdala evaluates, but doesn't generate panic
Patient SM, who has damage to both amygdalae, shows no response to fearful faces or threats yet can still panic in response to suffocation. Tye's working model is that the amygdala's roughly 13 subnuclei assign importance and meaning rather than producing autonomic arousal themselves.

5. Hunger can flip fear and reward priorities
Normally the negative-valence amygdala pathway can suppress the reward pathway, because escaping a predator matters more than eating. After one day without food, a big deal for mice given their high metabolism, the balance inverts and reward signaling can silence the fear pathway. The shift appears reversible, and the amygdala may sense hunger through receptors such as those for ghrelin. Tye cites the controversial 2011 Danziger study, in which judges' parole approvals were highest after meal breaks and plunged toward single digits before them. She stresses it was correlational.

6. Loneliness neurons were found by accident
Former postdoc Gillian Matthews was testing whether dorsal raphe dopamine neurons respond to cocaine. The saline controls showed synaptic strengthening too, because injected mice were housed alone. These neurons, unlike the familiar VTA dopamine neurons, are unpleasant to stimulate: mice avoid places where it happens. Yet stimulating them makes mice more social. Tye compares this to eating out of uncomfortable hunger rather than pleasure, and concludes these may be loneliness neurons, encoding an aversive need for social contact.

7. Social homeostasis: your set point shifts
Acute isolation produces a rebound of affiliative behavior when reunited. Chronic isolation produces aggression, territoriality or avoidance across humans, monkeys, mice and even flies. Tye's model is that you detect a deficit and try to reconnect, and if those efforts fail long enough, behavior drops off sharply and you adapt to a new baseline. Then your old normal level of contact feels like overload. She thinks many people experienced this shift going into and out of the pandemic.

8. Empathy tracks whether someone is an ally or an adversary
Tye defines empathy as understanding another's emotion and taking it on, distinct from emotional contagion like group panic. She speculates that empathy is inversely correlated with seeing someone as a competitor standing in your way. Once you realize someone is out to get you, empathy disappears. Long isolation may make everyone feel like a competitor. Whether empathy for positive and negative events is truly asymmetric remains an open question.

9. Prefrontal neurons predict who wins
In stable groups of four cage-mate mice, food-deprived and competing for a reward only one could collect, prefrontal activity stably encoded who was dominant. It also predicted above chance, up to about 30 seconds ahead, which mouse would win the next trial. For subordinates, prediction accuracy jumped near the cue, suggesting they watch the dominant and go when it seems disengaged. Dominants don't watch the subordinates at all. Huberman likens this to Don Draper in Mad Men saying, "I don't think about you at all."

EXAMPLES

1. Tye's one hour a week
To control input from the top down, Tye spends less than an hour a week on email and social media combined. An assistant flags what matters, and she opens only those messages for about 10 minutes a day. Otherwise she overcommits, fragments her attention and can't have epiphanies. She notes this depends on your job and resources, and says she worked differently as a trainee.

2. Reshuffled hierarchies
In preliminary, unreplicated work, Tye's lab ranked mice, then regrouped all the alphas together, all the betas together and so on. Alphas fight it out quickly. Intermediates seem to take longest to form a new order. That inbred mice behave so differently suggests rank during development shapes lasting traits, perhaps like birth order. Tye calls the link between eldest children and leadership loose.

3. Her pandemic experiment of one

Tye went from never being alone to some days seeing no one. At first it felt like free fall. Then she adapted, started a garden and grew comfortable alone. She now deliberately mixes lots of varied social experiences with protected alone time, which she says makes her social system more elastic and resilient. She considers being alone a distinct brain state.

4. Psilocybin under the microscope

Using Neuropixels probes recording thousands of prefrontal neurons in mice given psilocybin, Tye's lab asks whether psychedelics make transitions between hidden "mood" states more fluid, change how many states exist, or merge the neural representations of self and other. They test animals in conflict trials where reward and shock cues appear together, since the ambiguous gray zone is where valence assignment may shift. She cautions against psychedelic use, especially by young people.

OTHER RELEVANT

1. Why isolation research lagged

Harry Harlow's maternal-separation experiments, in which baby monkeys preferred a soft cloth surrogate to a wire one with milk, caused irreparable harm and were deemed cruel. That history, Tye says, left a gap in neuroscience on isolation, even though loneliness is linked to shorter lifespan, mood disorders, and worse outcomes in heart disease and cancer. She notes solitary confinement is considered torture.

2. Social media probably isn't real social contact

Tye predicts, while noting the study hasn't been done, that social media does little against loneliness. She believes meaningful contact depends on synchronous, shared interaction with some interbrain synchrony, and most social media is asynchronous: you react to things that already happened without you.

3. Dynamic hierarchies may be healthier

Huberman recalls a neighborhood pack where the leader changed with the activity: skateboarding, soccer, art or knowledge. Tye agrees that leadership based on competence at the task at hand beats fixed hierarchies. She adds that a key step for a young scientist is the first experiment they run that no one told them to do.

AMA #15: Fluoride Benefits/Risks & Vagus Nerve Stimulation

Date: 2024-02-01 · Duration: 0:29:03
URL: https://www.youtube.com/watch?v=j2sMqSDLd4k

KEYPOINTS

1. Whether fluoride harms you depends on the dose
Huberman pushes back on the listener's framing, 'how much is it harming us?', because it assumes harm. Fluoride clearly strengthens teeth and helps prevent cavities, but at high enough levels it is a poison. The real question is how much you are taking in from water, toothpaste and other sources. Note that this public portion of the AMA covers only fluoride; the vagus nerve stimulation segment is for premium subscribers.

2. Fluoride is legally contested in both directions
In 2024 a major lawsuit in California sought to remove fluoride from drinking water, citing evidence that high levels can disrupt thyroid function and possibly the brain. At the same time, residents of Buffalo, New York sued their city, arguing their water had too little or no fluoride and their children's teeth suffered. Huberman calls fluoride a 'barbed wire topic' because people get stuck on it whichever way they approach it.

3. Teeth constantly switch between losing and rebuilding minerals
Cavities form when bacteria, especially Streptococcus mutans, feed on sugar and produce acids that erode enamel (demineralization). Teeth can also remineralize by building organized crystals, like stacked Lego blocks, from hydroxyapatite. Early cavities that have not reached the deeper dentin layer can potentially fill in naturally this way.

4. Fluoride makes enamel crystals unusually strong
Fluoride inserts into the mineral crystals and forms bonds stronger than normal hydroxyapatite bonds. That makes teeth more resistant to acid, especially when exposure happens in childhood. Every dentist and periodontist Huberman consulted, from traditional to 'functional', agreed on this. Some noted that the bonds look structurally different under an electron microscope and would prefer natural remineralization.

5. Water fluoridation was a cheap public health measure, not the ideal method
Starting around the 1950s, governments added fluoride to tap water because it is an inexpensive way to reduce tooth decay across a population. Dentists told Huberman it was not chosen because it is the best way to care for teeth. It was chosen because many people do not look after their mouths well. Practices vary widely around the world.

6. High fluoride exposure may affect thyroid and possibly neurons
Huberman says high fluoride intake has been shown to disrupt thyroid hormone output and how the body uses it. Fluoride is also hypothesized, and still heavily debated, to be neurotoxic. Much of that evidence comes from cell studies in a dish, with some animal data. He stresses these effects are not necessarily occurring at drinking-water concentrations.

7. The CDC level is a concentration, not a personal dose
The CDC recommends 0.7 mg of fluoride per liter of drinking water as safe and effective for oral health. Your actual intake depends on how much you drink, whether a couple of cups or a gallon a day, and on body size. Children get proportionally more fluoride per kilogram from the same water, just as drug doses are scaled by body weight.

8. People tend to fall into three camps on fluoride
Some are not concerned and want strong teeth. Some are mildly concerned and want concentrations kept reasonable. Others oppose any fluoride in water. Huberman finds it understandable that people who read the health literature become more cautious, though he does not consider himself hyper-concerned.

EXAMPLES

1. Huberman's childhood fluoride poisoning
Around age five or six, during a dental fluoride-tray treatment, he decided to swallow all the sour gel to 'beat the test'. Within about three minutes he vomited. He tells the story to show fluoride really is toxic at high concentrations, not to scare parents away from fluoridated toothpaste or water.

2. How Huberman handles his own water
He filters the water he drinks, using pour-through and refrigerator filters and a recently installed whole-house filter on drinking taps. He does not bother filtering tap water used for cooking rice, pasta or oatmeal, and occasionally drinks straight from the tap. He has largely avoided fluoride toothpaste and reports very few cavities in adulthood.

3. Dueling lawsuits in California and Buffalo
The two cases ran at the same time: one arguing that any fluoride is too much, the other that its absence harmed children's teeth. Huberman notes he cannot confirm whether Buffalo's water truly had zero fluoride.

4. Brushing too hard backfires
Aggressive brushing can cause the gums to recede ('tenting'), creating pockets where bacteria get in. Huberman notes strong evidence linking oral bacteria to cardiac and metabolic disease, and possibly neurological disease. He recommends a soft toothbrush.

5. Two kinds of oral-health mistakes
Huberman sorts people into two groups. One is intensely diligent, using whiteners, mouthwash and constant brushing, and may harm the oral microbiome. The other brushes mainly for fresh breath and neglects the rest. Both damage oral health in different ways, and he promised a dedicated oral-health episode with mostly zero-cost fixes.

OTHER RELEVANT

1. Find out what is in your local water

Look up your city's fluoride level on public water-quality websites or get your tap water tested. Then factor in how much you drink and your body weight, or your child's, rather than relying on the 0.7 mg/L figure alone.

2. Filtering is a low-cost option if you are concerned

Many affordable filters reduce fluoride, and some people invest in whole-house systems. Huberman's view is that since inexpensive filters work and there is some concern about excess intake, removing fluoride from drinking water is reasonable. Where you land depends on your budget and level of concern.

3. Protect your teeth either way

Removing fluoride from water does not mean giving up on strong teeth. Twice-yearly cleanings, gentle brushing, protecting the oral microbiome rather than overusing harsh products, and fluoride or non-fluoride toothpastes all play a role. Huberman says early cavities can remineralize when they have not reached the dentin.

Tools to Enhance Working Memory & Attention

Date: 2024-01-29 · Duration: 1:31:12
URL: https://www.youtube.com/watch?v=CQlTmOFM4Qs

KEYPOINTS

1. Working memory is built to discard information, not store it
Short- and long-term memory depend on neuroplasticity: long-term potentiation, long-term depression and, in some cases, neurogenesis. Working memory, as far as anyone knows, does not. It is a circuit running the same algorithm over and over to hold information just long enough to sequence actions, then drop it. Huberman's example is a morning routine: water, coffee, shoes, then deciding your running route.

2. Almost every daily task depends on working memory
From waking to sleep, sequencing cognitive and motor steps requires it. People with diminished or (rarely) absent working memory struggle badly to order everyday activities. Deficits in working memory and attention are also hallmarks of frontal traumatic brain injury, Parkinson's, some dementias and ADHD.

3. Dopamine sent to the prefrontal cortex sets your working-memory span
Brainstem dopamine neurons project to the prefrontal cortex (the mesocortical pathway). How much dopamine is released there per unit of time strongly predicts whether capacity is low, medium or high. In imaging studies, short spans correlate with less dopamine available for release and longer spans with more.

4. Dopamine and working memory follow an inverted U
In bromocriptine studies from Mark D'Esposito's lab at UC Berkeley, low-span people improved substantially after taking the drug, often going from 0–3 remembered words to 4 or even 6. High-span people gained little at low or moderate doses, and at the highest dose their performance dropped to low-span levels even though dopamine availability had risen. More dopamine helps only up to a point.

5. Working memory has two separable parts: switching tasks and ignoring distractors
Task and context switching relies largely on dopamine to the basal ganglia, the brain's 'go/no-go' circuitry. Filtering out distractors relies mainly on dopamine to the prefrontal cortex. Studies that selectively boost one pathway improve one ability without the other, so protocols differ in which aspect they help.

6. Your baseline score determines whether boosting dopamine is a good idea
Because of the inverted U, Huberman says people with already-high spans probably should not stack dopamine-raising protocols right before working-memory-heavy tasks. Those protocols can still be useful at other times. People with low or moderate spans are the ones most likely to benefit.

7. NSDR and yoga nidra can raise baseline dopamine substantially
Yoga nidra ('yoga sleep') is lying down with a script that guides long exhales and muscle relaxation; NSDR is Huberman's term for the version without intentions or mystical language. In one study, baseline dopamine in the basal ganglia was up to 60% higher after an hour-plus session compared with a control protocol. He notes it is a single study and that shorter sessions were not tested.

8. Deliberate cold exposure produces long-lasting catecholamine increases
In a study where people sat neck-deep in water in the low 60s °F for 45 minutes or more, epinephrine, norepinephrine and dopamine rose significantly and stayed up for hours. Colder water for a shorter time, such as about 30 seconds at 45 °F, may give a comparably large rise. He prefers these slow-tapering increases to the sharp spikes from video games, sex or chocolate.

9. Binaural beats give small-to-moderate working-memory gains
With headphones, each ear hears a different frequency and the difference (for example 40 Hz or 15 Hz) entrains certain circuits. A 2019 study of 24 people aged 19–31 found modest but significant working-memory improvements with 40 Hz beats. A 2016 study using 15 Hz beats linked changes in cortical connectivity to better visuospatial working memory. Whether this works through dopamine is unknown.

EXAMPLES

1. The six-sentence span test
Listeners hear six sentences (for example 'some reptiles eat only once a year') and then recall the last word of each: costs/up, summer, cars, year, life, country. Recalling 3–4 is average; 4–6 counts as high span and fewer than three as low span. Getting all six is very rare.

2. Letter-string warm-up
Before the sentence test, he reads strings of 5–7 letters (J K Z P I; R O M K L E; W A C Q V D N), repeating each one to make it easier than a lab version. Attention split with driving or chores lowers scores.

3. Tyrosine in a multitasking environment (Thomas et al., 1999)
Participants took 150 mg/kg of crystalline L-tyrosine mixed into applesauce, versus placebo, and showed statistically significant but not large working-memory gains while multitasking. For Huberman at about 100 kg, that would be 15 g. He feels a clear lift from 500–1,500 mg and will not recommend the study dose.

4. Bromocriptine timing
The dopamine agonist peaks in about 90 minutes, which is when testing was done. It is sometimes prescribed off-label by neurologists for TBI, Parkinson's-related or ADHD-related working-memory deficits, but it is not a standard treatment for those conditions.

OTHER RELEVANT

1. Test yourself first, then pick tools

Use the sentence test to estimate your span. Low or moderate scorers can try NSDR or yoga nidra (free scripts, including 10-minute versions and ones by Kelly Boys running from about 8 to 45 minutes), or a cold shower 30–60 minutes before focused work. The cold-shower timing is his mechanistic guess; it has not been tested directly.

2. Cold-water safety

Most people use 30 seconds to 3 minutes in a shower, plunge or other body of water. He insists you never combine hyperventilation or breath holds with cold water, because you can pass out and die.

3. Supplements: talk to a provider and start with a minimal dose

For L-tyrosine he suggests trying about 250 mg at 50 kg or 500 mg at 75–100 kg, and watching for a crash 3–4 hours later. Mucuna pruriens is essentially L-dopa (about 99%) and potent; studies use 1–5 g, but he suggests starting at 250–500 mg and only with a doctor's approval.

4. Prescription stimulants have a place

He believes Adderall and Ritalin (which differ in their dopamine-to-norepinephrine ratio), and modafinil in some cases, are probably over-prescribed but genuinely help some children and adults, partly by enabling plasticity in attention circuits. Behavioral and nutritional tools may allow some people to lower their doses, but any change should be made with a physician.

Journal Club with Dr. Peter Attia | Effects of Light & Dark on Mental Health & Treatments for Cancer

Guest: Dr. Peter Attia
Date: 2024-01-22 · Duration: 3:08:31
URL: https://www.youtube.com/watch?v=TG8VM5-CTfw

KEYPOINTS

1. Bright days and dark nights are linked to better mental health in 86,000 people
Huberman presents a Nature Mental Health paper that used wrist light sensors on roughly 86,000 UK Biobank participants. It builds on an earlier study of 400,000 Biobank participants linking outdoor time to better mood and sleep. The authors conclude that avoiding light at night and seeking light during the day may be a simple, effective non-drug way to broadly improve mental health. Huberman criticizes the title, which makes it sound as if light itself is harmful.

2. Night light showed a dose-response with depression, self-harm and PTSD
Against the quartile with the least night light, the depression risk rose to almost 20% higher in the third quartile and about 25% higher in the fourth. Self-harm was flat across the first three quartiles, then jumped about 30% in the top one. The highest daytime-light quartile had about a 20% lower risk of depression. The associations held largely independent of sleep duration and exercise. Attia singled out the links between night light and PTSD and between daytime light and psychosis, and found anxiety and bipolar results less striking.

3. In bipolar disorder, night light looked harmful even with plenty of daytime light
The authors emphasize that for bipolar symptoms, light at night appeared especially problematic regardless of how much daytime light people got. Huberman ties this to ICU psychosis: non-psychotic patients in windowless, constantly lit, noisy units can develop psychosis that clears once they go home.

4. The mechanism runs through melanopsin cells wired to mood centers
Intrinsically photosensitive retinal ganglion cells signal the circadian clock and, one synapse away, the habenula and other mood areas. They sit mostly in the lower two-thirds of the retina, so they sample light from above. They add up photons over time rather than switching on instantly. Huberman credits David Berson at Brown for showing these cells can fire for hours under bright light.

5. Indoor light is far dimmer than it seems
Huberman says a bright indoor space is about 4,000 to 6,000 lux, while noon sun is over 100,000 and can reach 300,000. An overcast day can still beat indoors. Light through a window you can't see the sun through is largely filtered, skylights help, and glasses or contacts are fine while sunglasses cut a lot. He notes people now spend about 90% of their daytime indoors.

6. Low-sun light sets the clock and midday light lifts mood
Color-opponent cells compare blue with yellow and orange at sunrise and sunset. Morning light advances the clock and evening light delays it, and the two balance. Midday is a circadian dead zone for shifting the clock, but bright light then still boosts mood. If you can only manage one, choose morning. If you miss a day, get roughly twice as much the next morning, because the system averages over two to three days.

7. Most solid tumors are visible to the immune system but evade it
Attia says lung, breast, prostate, colorectal and pancreatic cancers cause more than half of US cancer deaths, and at least 80% of solid tumors make antigens the immune system recognizes. They escape by secreting suppressors such as IL-10 and TGF-beta and by heavy glycolysis (the Warburg effect), which may serve cell building blocks per a 2009 paper by Vander Heiden, Thompson and Cantley, and acidify their surroundings to repel immune cells.

8. Checkpoint inhibitors take the brakes off T cells
CTLA-4 on T cells acts as a brake after antigen recognition. Earlier, high-dose interleukin-2 added gas, helping only about 10% of patients with melanoma or kidney cancer. Blocking CTLA-4 (ipilimumab) or PD-1 (pembrolizumab) removes the brake. The discoverers of these checkpoints won a Nobel Prize, which Attia believes is the only one for immunotherapy.

EXAMPLES

1. The ipilimumab phase 3 trial in metastatic melanoma
Patients had run out of standard options. They were randomized 3:1:1 to ipilimumab plus a gp100 peptide vaccine, ipilimumab alone, or gp100 alone, so about 80% got the drug. Median survival was about 10 months on either ipilimumab arm versus 6.4 months on gp100. Roughly 20% of treated patients were alive at about 56 months, while essentially all controls had died by about 44 months.

2. Median survival versus overall survival
Attia argues that treatments have extended median survival for metastatic solid cancers, but the long-term cure rate is still essentially 0%, as in 1970. Exceptions include testicular cancer and GIST. He criticizes drugs that cost $50,000 to $100,000 for weeks of benefit, citing a pancreatic cancer drug that added days.

3. Side effects track the mechanism
Nearly everyone in all arms had some adverse event, and grade 4 events were similar (about 6 to 8%), likely reflecting the advanced disease. Immune-related events were about 60% on ipilimumab versus about 30% on gp100, with grade 3 to 4 events in 10 to 15% versus 3%. These included colitis severe enough to need IV fluids, rashes and vitiligo. Attia once co-wrote a paper suggesting autoimmunity predicts response, and wished this trial had tested that. He also notes weight-based dosing (3 mg/kg) means men get larger doses, which may explain sex differences.

4. A Lynch syndrome patient cured, and left without a pancreas

Attia's friend with Lynch syndrome survived colon cancer, then developed unresectable pancreatic cancer about five years later. Because mismatch-repair defects create many mutations, he joined a pembrolizumab trial. His cancer vanished and he is cancer-free about 10 years later, but his immune system also destroyed his pancreas, leaving him insulin-dependent. Melanoma and kidney cancer responded early for a similar reason: high mutation counts.

5. Rick Rubin's red bulbs

While staying in Attia's guest house, Rubin replaced every bulb with red light, and Attia later took the bulbs home. Huberman notes cheap red bulbs work. Attia has softened on blue light: what he does on his phone at night, like doomscrolling or email, matters more to him than screen brightness.

OTHER RELEVANT

1. Huberman's four light habits

See low-angle sun in the morning and again in the late afternoon or evening; the sun doesn't need to cross the horizon. Get as much bright light as you safely can through the day; midday sunglasses are fine, but blink and don't stare. Keep nights dim but not pitch black, so you don't trip. Huberman says evening sunlight can halve melatonin suppression from later artificial light, citing a Scientific Reports study.

2. Read the study, not the headline

Attia's journal-club tips: redraw confusing figures with arrows, check whether error bars cross the 1.0 line (an odds ratio of 0.7 means about 30% lower odds), and expect large samples to give tight error bars. Remember that observational light data can't rule out reverse causality or a Hawthorne effect from wearing a sensor.

3. For hospitalized loved ones, get them near a window

Huberman's standard advice when people with a relative in the hospital contact him: get them near a window and protect their sleep-wake cycle as much as possible, given ICU psychosis.

Tools to Reduce & Manage Pain | Dr. Sean Mackey

Guest: Dr. Sean Mackey
Date: 2024-01-15 · Duration: 2:56:42
URL: https://www.youtube.com/watch?v=K9lORz2_XSU

KEYPOINTS

1. Nociception isn't pain; the brain creates the experience
Mackey's central message is that signals from an injured shoulder or neck are nociception, electrochemical impulses that the spinal cord modifies and relays upward. Pain only arises when those signals converge with brain systems for emotion, cognition, memory and action. That makes everyone's pain unique, and it's why the biomedical model's assumed one-to-one link between injury and pain is wrong. Chronic pain affects about 100 million Americans and costs roughly half a trillion dollars a year.

2. NSAIDs and acetaminophen: weigh healing against function
Ibuprofen and naproxen are the over-the-counter NSAIDs. Ketorolac and celecoxib (a COX-2 inhibitor that is gentler on the stomach) require a prescription. Acetaminophen acts more centrally in the brain. Mackey says two extra-strength Tylenol four times a day is safe for many people with good liver function who don't abuse alcohol, though guidance varies between 2 and 4 g a day. On worries that anti-inflammatories slow healing, his approach is pragmatic: if a drug helps you sleep and function, that also aids recovery.

3. Caffeine boosts painkillers
Caffeine touches the prostaglandin pathway, which is why it helps with headaches and migraines and potentiates analgesics. Because both caffeine and NSAIDs can irritate the stomach, Mackey suggests having food in your stomach when combining them.

4. Gate control and descending pathways change the volume of pain
Patrick Wall and Ron Melzack's 1960s gate control theory showed that fast touch fibers activated by stroking can damp pain signals in the spinal cord, which is why rubbing a bump helps. Pathways descending from the brain also inhibit spinal pain signals. In conditioned pain modulation ('pain inhibits pain'), a second painful stimulus reduces the first. This system appears impaired in conditions such as fibromyalgia.

5. Cold, heat and pain thresholds
The traditional rule is cold for about the first 48 hours after an acute injury, then heat. Cold reduces release of inflammatory sensitizers like prostaglandins, cytokines and histamine, and slows nerve firing. Heat increases blood flow and relaxes muscle. Mackey sees huge individual variation and tells people to use whichever works. On average, men have higher heat-pain thresholds than women, but he calls 'men are tougher' a terrible conclusion from small average differences, since a lower threshold may even be protective.

6. Psychological tools measurably reduce pain
Distraction helps but fails at night, when people with chronic pain most need it. Jon Kabat-Zinn's mindfulness-based stress reduction, which involves non-judgmental acceptance of pain, has evidence for low back pain, anxiety and depression. Mackey says 'everybody should do MBSR,' while stressing that these tools work for some people some of the time. Cognitive reframing of what the pain means is a third approach.

7. Hurt isn't harm, and catastrophizing amplifies pain
Knowing the difference between hurting and being injured is central. Anger reliably makes pain worse. Mackey cites John Burns's distinction between 'anger out' (expressed yelling) and 'anger in' (contained seething), with data suggesting 'anger in' is worse. His clinic tracks depression, anxiety, anger, fatigue and sleep to treat the whole person.

8. Opioids are a tool, and abrupt cutoffs backfire
Mackey rejects binary thinking about opioids, which the body also makes endogenously. Some doctors overprescribed after buying marketing claims, but he also describes a well-managed patient cut off from occasional Vicodin who turned to black tar heroin. When California targeted prescribers on death certificates to cut opioid deaths, deaths doubled because doctors abandoned patients. He favors gentle, compassionate tapering and not conflating the overdose crisis with the pain epidemic.

9. Kratom and cannabis remain uncertain
Mackey worries that kratom's purity and dose are unknown. In controlled lab settings, cannabis has been shown to reduce pain, but products vary widely in THC-to-CBD ratio and dose. He says cannabis 'clearly' should not be a Schedule I drug, which hampers research.

EXAMPLES

1. The tennis player with Morton's neuroma
A master's-level tennis player arrived on crutches, depressed after months of being told not to bear weight. Mackey diagnosed a Morton's neuroma, a painful but harmless thickening around toe nerves, and explained it hurt without causing harm. The patient lit up: 'You mean I can play tennis?'

2. Love as an analgesic
In Mackey's study, Stanford students in the early phase of a romantic relationship felt significantly less pain from a stimulus delivered in a brain scanner while viewing photos of their beloved than of an equally attractive acquaintance. The more in love they were on the passionate love scale (some reported thinking of their partner 80% of the day), the greater the relief. A demanding distraction task also reduced pain.

3. Huberman's dog

Huberman says low-dose testosterone eased his elderly dog's aches, improving movement and sleep. Instead of backlash, he heard from hundreds of veterinarians wishing they could prescribe it.

4. Mackey's alpha-lipoic acid trial run

Taking alpha-lipoic acid himself, Mackey couldn't push his heart rate past 150 during high-intensity intervals. He attributes this to its action on T-type calcium channels, which are also present in the heart, and calls it an annoyance rather than an adverse event.

OTHER RELEVANT

1. Pace activity to break the boom-bust cycle

Chronic pain waxes and wanes. Overdoing it on good days leads to crashes and bed rest, which entrains pain in the brain. Physical therapists, psychologists and physicians teach steady pacing. Mackey calls PT 'absolutely crucial' for chronic pain.

2. Supplements with some evidence

Acetyl-L-carnitine improved nerve conduction velocity in diabetic neuropathy studies. Alpha-lipoic acid (a free-radical scavenger and T-type calcium channel modulator) may help neuropathic pain but can upset the stomach. Vitamin C before nerve-related surgery may reduce some post-surgical nerve pain conditions. Omega-3s help with chronic pain, and creatine shows benefit in small pilot studies. Discuss these with a clinician.

3. Judge therapies by durable benefit

For acupuncture, chiropractic or massage, ask whether the relief lasts beyond a few hours. Mackey's advice on acupuncture: 'if you can afford the wallet biopsy, give it a try,' with a skilled practitioner.

4. Hunt food triggers carefully

Food-related pain can lag by days, which makes patterns hard to spot. A safe elimination diet of eight to ten basic foods, adequate in calories and macronutrients, with foods added back gradually, can reveal triggers.

How to Prevent & Treat Colds & Flu

Date: 2024-01-08 · Duration: 2:05:49
URL: https://www.youtube.com/watch?v=AtChcxeaukQ

KEYPOINTS

1. Cold viruses usually get in through the eyes
Cold viruses are tiny, travel through the air and skin contact, and can survive on surfaces for up to 24 hours. Huberman says the most common route of infection is touching your eye region, and the mouth and lips much less often. Symptoms typically show up 1–2 days after exposure.

2. Exposure doesn't guarantee infection
Even with a serotype you've never encountered, a well-functioning immune system can fight off the virus before you get sick or pass it on. That's why most of the episode focuses on tools that strengthen innate immunity.

3. 'I'm past the contagious stage' is usually a myth
You're most contagious when you feel worst, and still contagious as you start to recover. Most data suggest the contagious phase ends about 5–6 days after your worst symptoms. Anyone still sneezing, coughing, blowing their nose or waking up groggy is still a 'walking, talking' vector and should stay home where possible.

4. A flu shot is a bet on which strains are circulating
Huberman personally doesn't usually get the flu shot, but frames it as an individual decision to make with your physician. He suggests weighing it more heavily if you live with immune-compromised family, work in a school or have high exposure. He also notes most people can't reliably tell whether they have a cold or flu.

5. Nasal breathing protects the upper airway
Breathing through your nose, except when talking, eating or exercising hard, keeps the nasal microbiome healthy and diverse. Huberman cites a study of mouth-breathing children showing altered oral and nasal microbes and more upper-respiratory infections, plus the book 'Jaws' by Stanford colleagues. Nasal breathing also warms incoming air, which makes it harder for viruses to embed in the nasal lining.

6. Up to 60 minutes of hard exercise boosts innate immunity; marathon-level loads suppress it
Citing a 2019 review in the Journal of Sport and Health Science, Huberman says sessions of 60 minutes or less at high subjective effort (not all-out) improve exchange between blood and lymph and keep innate immune activity raised for up to 24 hours. Brisk 60-minute walks increase T-cell, natural killer cell and macrophage activity. People training for or just finishing a marathon show sharply reduced T-cell and NK function and very high stress hormones and inflammatory cytokines.

7. After a bad night, sleep first; if you can't, train lighter
If you can go back to sleep, that's the better choice. If you can't, exercising at 25–50% lower intensity and duration can offset some immune and blood-sugar effects of one night's sleep loss and help you fall asleep on time that night. Exercise is not a replacement for sleep.

8. Zinc has the strongest supplement evidence, at the right dose
Doses below about 75 mg don't seem to work; around 100 mg (once, or as two 50 mg doses) does, taken with a meal because zinc on an empty stomach causes nausea. Adults over 65 may benefit most. Children under 15 shouldn't take much zinc, and pregnant women should ask their doctor first.

9. Vitamin C megadoses are probably not worth it
There's weak evidence that 6–8 g a day might delay or shorten a cold, at the cost of likely stomach upset. A 2023 meta-analysis of nine randomized trials claiming a benefit was retracted because placebo groups had been double-counted. If your diet or a multivitamin covers vitamin C, extra is probably a poor immune investment.

10. Vitamin D matters most if you're deficient
An individual-participant meta-analysis of more than 20 randomized trials found supplementation reduced acute respiratory infections overall, and deficient people have weaker immune function. Huberman says most physicians would consider 1,000–2,000 IU a day safe for most people, but you need blood work to know whether you need more.

EXAMPLES

1. Huberman's 30-second daily health log
Huberman gets a serious cold or flu about every 18–24 months and logs workout intensity and sleep quality in his calendar each day. Looking back, illnesses followed two hard workouts in one day or hard training combined with cold exposure during overseas travel. He calls it a limited personal data set but recommends the habit.

2. Sauna study
Participants did 10 sessions over 3 weeks, each three 15-minute rounds (roughly 176–210°F in practical terms) separated by 2-minute cool showers. Cortisol rose after the first and tenth sessions, along with leukocyte counts, but in trained athletes the increase only became significant by the last session. Huberman's takeaway is that heat-adapted people need a stronger stimulus. He adds that sauna isn't for pregnant women or children.

3. Carbohydrates after training
Eating complex carbohydrates (rice, oatmeal, pasta) or fruit after exercise reduced inflammatory markers by about 30–40% compared with water alone, especially after fasted training.

4. Zinc acetate and recovery speed
In one study, people who already had a cold and took 90 mg a day of zinc acetate recovered three times faster than those

who didn't.

5. NAC instead of decongestants

A 1997 study found that 600 mg of N-acetylcysteine twice daily for 6 months significantly lowered the chance of getting influenza. During a sinus infection, after consulting ICU physician Dr. Schwell, Huberman took 600–900 mg three times a day and found it a powerful mucus-clearer. He avoids alpha-1 agonist decongestants, which cause rebound congestion and can become habit-forming.

OTHER RELEVANT

1. Keep your hands away from your eyes

After shaking hands, people usually touch their face within about 30 seconds. Sanitize or wash before touching your eyes, and in high-risk periods think twice about hugs and cheek kisses, without becoming fearful of the gym or the office.

2. Eat 2–4 servings of low-sugar fermented foods a day

Choose refrigerated sauerkraut, kimchi, pickles with live cultures, plain yogurt and lower-sugar kombucha; the brine counts too. A diverse gut microbiome supports innate immunity, and sugary versions bring their own problems.

3. Use echinacea sparingly, if at all

Huberman found no strong evidence for echinacea, and prolonged use may reduce white blood cell and natural killer cell counts. If you like it, limit it to times you feel run down or your worst winter month, and never take it for more than four weeks straight. Check any supplement plan with your physician.

Protocols to Access Creative Energy and Process | Rick Rubin

Guest: Rick Rubin
Date: 2023-12-25 · Duration: 2:28:09
URL: https://www.youtube.com/watch?v=GpgqXCkRO-w

KEYPOINTS

1. Creative blocks come from judgment, not a lack of ideas
About 10% of listener questions were about writer's block. Rubin says to look past 'the block' to its cause, which is almost always self-judgment ('I'm not good enough, I have nothing to say') or fear of outside judgment ('nobody will like it'). The story of being blocked is made up, and you end up living inside it.

2. Treat everything you make as a diary entry
No one can tell you your diary entry wasn't good enough or wasn't what you experienced. Approached as an honest reflection of who you are at that moment, made to the best of your ability, the work carries no world-changing or sales expectations, and there's nothing to block.

3. Ideas come through you, not from you
Rubin sees creators as vehicles for an infinite supply of information. If nothing comes at your desk, go for a walk, and something you see will likely spark a seed. He never abandons ideas: they have their own timing, so he keeps several projects going and works on whichever is flowing.

4. Thinking about outcome while making something undermines it
Asking 'is this worth it?' depends on an outcome you don't control. Rubin calls making the work a devotional practice: make the best thing you can, and any energy spent on how it will be received is wasted while you're making it. Thinking about how to reach people is fine once it's finished.

5. Deadlines help at the end, not the beginning
Early on Rubin has no idea what a project will be, and time pressure would undermine the freedom it needs. Once 'the code's cracked' and you're refining details, a deadline can help.

6. Start free, then organize
To the many listeners who equate creativity with chaos, Rubin says the early phase is free, playful improvisation with no expectations, where 'sometimes when it goes somewhere dangerous that's when it gets interesting.' Once something feels new, the process becomes more controlled. He also starts every project with anxiety about whether it will be good, even while accepting uncertainty.

7. Sensitivity is the artist's gift and burden
Responding to a passage from his book, that many artists overdose numbing the same sensitivity that made them artists, Rubin says he is unusually sensitive himself. He wears red glasses, lives a protected, 'monk-like' life because stimulation interferes with his inner state, and can't be around certain voices. An only child, he spent most of his time alone and credits that with his resistance to peer pressure.

8. Rubin's daily rhythm is built around light
He wakes slowly, goes into the sun 'as naked as possible', then within about an hour takes a long beach walk or goes to the gym, sometimes stretching first. He avoids work until 11 am or 1 pm and does focused work until about 6. From sunset he wears red glasses in red-only light, avoids stimulating calls, is in bed by about 10 and asleep within 15 minutes.

9. Memory is personal storytelling
When Henry Rollins publicly told a story about Joe Strummer offering Johnny Cash a song at a gathering Rubin attended, Rubin said he didn't remember it. It might be true or entirely made up; each person's memory reflects what was going on in their own head. Rubin says Johnny Cash mattered for 'the human being underneath', not just his singing or songwriting.

EXAMPLES

1. Coherence breathing for heart rate variability
Rubin opened with a five-minute guided session at six breaths per minute, counting breaths to stay occupied. He started it because his HRV was low; he aims for 10 minutes a day, sometimes twice, and says 20 minutes noticeably shows in his HRV numbers. He has paired it with air squats, or with sitting in the sun after treading water.

2. 45 years of meditation
Rubin learned Transcendental Meditation at 14 and once meditated through an entire cross-country flight. Sessions may drift into breathing, gratitude or the metta loving-kindness practice learned from Jack Kornfield. That practice starts with 'may I be filled with loving kindness...', extends to family after about a year, then community, and the planet after around five years. Quoting Maharishi, each session is a deposit in a bank.

3. The dermatologist on the beach
A fully covered man with insomnia, wearing sunglasses, told Rubin he'd spent 40 years as a dermatologist keeping patients out of the sun, then examined Rubin's back and called it 'perfect skin'. Rubin, who spends hours in the sun daily, argued that sunglasses were mixing his body's day–night signals. This is Rubin's anecdote, not medical advice.

4. Ads as a creative problem
Rubin didn't want to read standard ads on his Tetragrammaton podcast, so he reinvented them, and they became his favorite part of the show; Huberman replayed them on their trip in Italy. Innovation often comes from solving a practical slot you're uncomfortable filling the normal way.

5. Veganism that didn't work

Rubin followed a vegan diet for a long time with good intentions but had much worse health, major weight gain and illness. He abandoned it, an example of his 'we all know nothing, try it and see' approach.

OTHER RELEVANT

1. Get to a complete draft first

Rubin's book-writing advice to Huberman: the sooner you reach a complete draft you're 'happyish' with, the better. Don't get bogged down in individual details before the whole thing exists.

2. Expressive writing to clear the system

Huberman's diary entries run 1–8 handwritten pages, starting in capitals and switching to cursive as he speeds up; he's kept them since high school. He writes to unclog frustration and has learned to enjoy the cycles between peak experiences.

3. Notice the real fear behind avoidance

Hearing the answer on blocks, Huberman realized his urge to keep texting people in his silent new office came from fear of separation: that no one would be there when he left the 'tunnel of creation'. Naming the fear helped.

4. Psychedelics need setting and introspection

Rubin has never tried them but is curious. Huberman, who took MDMA in a therapeutic trial, warns that without an eye mask the experience can anchor on an external cue, like hours of loving a plant. The deep introspective work is best done with a clinician present.

LIVE EVENT Q&A: Dr. Andrew Huberman Question & Answer in Chicago, IL

Date: 2023-12-13 · Duration: 0:54:44
URL: https://www.youtube.com/watch?v=LRM5LutB538

KEYPOINTS

1. Brain health in later life rides on vascular health
Asked by someone about to turn 70, Huberman's answer was the one he gives everyone: the brain is a heavy fuel consumer, so whatever keeps arteries and capillaries clear helps it. Borrowing from Peter Attia, he cites about 150 to 200 minutes per week of zone 2 cardio, movement at which you can just barely hold a conversation, plus resistance training two or three times per week for everyone.

2. Load-bearing exercise and strength may protect cognition
Load-bearing movement releases hormones from bone that cross the blood-brain barrier and may support neurons in areas such as the hippocampus. He flags that this extends mostly animal data to humans, with some human data emerging. He mentions a new paper from Andy Galpin's lab and collaborators correlating cognitive health with strength, and notes that weakening grip and growing left-right grip asymmetry track with cognitive decline.

3. Fine control of the extremities is a marker of nervous-system health
Floppy feet and an inability to extend or spread the toes are among many correlates of dementia. Newborns are tested for the Babinski reflex for the same reason. Huberman, who has broken one foot several times, has been using a toe spreader: painful at first, but improving toe spreading gives more foot stability and pain-free movement.

4. For shift workers, consistency and light matter most
Shift work is bad for a diurnal species, and swing shifts that keep changing are the worst, so try to keep one schedule for at least two weeks. To wake up, get bright light in your eyes, sunlight or artificial, mainly because it acutely suppresses melatonin. He prefers an inexpensive 900 lux LED over costly daylight simulators.

5. Sleep when you can if the schedule is chronic
For a long-term pattern such as a firefighter's 24 hours on and 48 off, or new parenthood, grab whatever sleep you can. For a one-off disruption such as a trip to Europe, there is no need to maximize sleep; stay with the local schedule instead.

6. Hypnosis combines narrow focus with deep relaxation
Drawing on Stanford psychiatrist David Spiegel's work, Huberman describes clinical hypnosis as self-directed rather than stage hypnosis. Normally plasticity requires intense focus followed later by deep rest; hypnosis marries the two states, which may speed neuroplasticity. In highly hypnotizable people, success rates for smoking cessation and pain relief are impressive. He wishes it had a better name, the same reason he rebranded yoga nidra as NSDR.

7. Psychedelics likely work by shifting neuromodulators, and the risks are real
Rewiring ultimately comes from shifts in dopamine, serotonin, norepinephrine and acetylcholine. Psilocybin is structurally very similar to serotonin and activates specific serotonin receptors; roughly 12 to 20 good-sized trials at places such as Johns Hopkins, UCSF and Switzerland suggest benefits for treatment-resistant depression, done with preparatory and integration sessions. An open question is whether the subjective trip matters or only the serotonin. He calls microdosing data unconvincing, MDMA-assisted therapy for PTSD more robust, and says kids should absolutely not use psychedelics, nor anyone predisposed to bipolar disorder or schizophrenia.

8. Meditation sharpens focus but can disrupt sleep near bedtime
Wendy Suzuki's work shows 10 to 13 minutes of daily meditation improves memory and focus. Footnotes in those papers indicate meditating close to bedtime can impair sleep, because meditation is a focusing exercise. For trouble sleeping, including falling back asleep in the middle of the night, he recommends NSDR instead.

9. NSDR can partly offset lost sleep, though Matt Walker disagrees
Walker would say nothing replaces sleep. Huberman's read is that 10 to 20 or 30 minutes of NSDR each morning after a short night restores some of the lost feeling of wakefulness. A study with the Stanford sleep lab is underway, and some military units that cannot sleep rely on such tools, though they would prefer 8 to 10 hours of sleep.

10. Daylight saving time is anti-biology
Citing chronobiologist Samer Hattar at the NIMH, Huberman says the time change increases car crashes, heart attacks and depression, and that claims it reduces evening crime are unsubstantiated. View low-angle morning and evening sunlight, which the Stanford ophthalmology chair confirmed carries little cataract or macular risk, longer on cloudy days, or use artificial light.

EXAMPLES

1. Richard Axel's nicotine gum
Visiting the Nobel laureate at Columbia, Huberman watched him chew at least five pieces of Nicorette in a short meeting, because nicotine's cholinergic and dopaminergic effects may protect against Parkinson's and Alzheimer's. Huberman does not recommend it, noting it raises blood pressure and causes vasoconstriction.

2. The Spiegel eye-roll test
Hypnotizability is assessed by looking upward and closing the eyelids while keeping the gaze up. Upward gaze is linked to alertness and downward gaze plus lid closure to drowsiness, so people who can hold both, showing the whites of their eyes, can be very awake and very relaxed at once.

3. Yoga nidra at an addiction and trauma center
Huberman first encountered yoga nidra in 2017 at a Florida recovery center whose therapist has clients do 30 minutes,

eventually an hour, each morning, waking an hour early to use the liminal state between sleep and wakefulness.

4. Non-protein amino acids as a next frontier

He predicts more attention to non-protein amino acids found in high density in seeds and nuts. The late Stanford scientist Ed Rubenstein hypothesized that, consumed in abundance and perhaps especially in liquid form, they might incorporate into human proteins and cause misfolding linked to neurodegeneration. Huberman labels this speculation and says seed oils are not inherently bad once calories are accounted for.

OTHER RELEVANT

1. Advice for a 19-year-old's hyperplastic brain

Learn how you learn, focus and rest. Stress and focus are fine as long as you can sleep well and fall back asleep. Have a cardio and a resistance activity you enjoy, a self-awareness practice such as journaling or meditation, and people you like around you. Learn an instrument, which improves broader learning even later in life, and do not worry that plasticity ends at 25.

2. Trust your early sense of right and wrong

Rereading his old journals, Huberman finds he often knew better all along even when he did not act on it. Avoid rigidity about protocols, and do not spend years trying to resolve relationships with people you simply did not like.

3. Cannabis cautions

He does not demonize cannabis and acknowledges clinical uses, but very high-THC products can be a problem, especially for people predisposed to psychosis. For anyone claiming it is not addictive, he suggests stopping for a week and noticing sleep and mood.

4. What education should add

He would teach children early how the brain and body work and give them zero-cost levers for stress, sleep and nutrition, and for avoiding social isolation.

The Causes & Treatments for Autism | Dr. Karen Parker

Guest: Dr. Karen Parker
Date: 2023-12-11 · Duration: 2:56:28
URL: https://www.youtube.com/watch?v=ccrbE0QHy94

KEYPOINTS

1. Autism prevalence is now about 1 in 36 U.S. children
Parker, a Stanford researcher, says the rate rose from 1 in 44 just a couple of years earlier. She calls the increase multifactorial: more awareness and routine early screening explain part of it. Autism is male-biased, and it is highly heterogeneous: 'If you've met one kid with autism, you've met one kid with autism.'

2. Diagnosis rests on two core features
Under the DSM-5, an expert (usually a psychiatrist or psychologist) looks for pervasive social interaction challenges and restricted, repetitive behaviors. Many autistic people also have anxiety, sensory challenges, seizures or sleep disorders. For most people, autism has lifelong impact, though some outgrow the diagnosis and some respond well to behavioral therapy while others see minimal benefit.

3. Genes matter a lot, and traits run on a continuum
Parker estimates that about 40–80% of autism is genetic, with roughly half linked to common genetic variants. Younger siblings of autistic children are at higher risk, which researchers use in prospective 'baby sib' studies. Autistic traits measured by the Social Responsiveness Scale or Autism Quotient are spread through the general population. They are higher among people in intense STEM fields, even without a diagnosis.

4. Environmental risk factors interact with biology
Associated risks include factors such as maternal illness during pregnancy. These come mainly from large epidemiological studies, since experiments in developing children are rarely possible. Huberman raises Pasko Rakic's mouse work linking repeated prenatal ultrasound to neuronal migration errors. Huberman emphasizes 'perhaps' and notes that the idea never gained traction.

5. Only two drugs are FDA-approved for autism, and both are antipsychotics
They treat associated features like irritability rather than core social symptoms and carry side effects like weight gain. That gap is why Parker focuses on neuropeptides that regulate social behavior: oxytocin and vasopressin, which are ancient, evolutionarily conserved molecules made in the hypothalamus.

6. Oxytocin may help a subgroup, not autism in general
In a study of about 200 children (autistic, unaffected siblings and controls), lower blood oxytocin tracked greater social difficulty in all groups, but it did not separate autism from non-autism. In Parker's double-blind trial with child psychiatrist Antonio Hardan, children given oxytocin twice daily for four weeks benefited if they started with low oxytocin. A later multi-site phase 3 trial found no overall benefit. Parker thinks measurement problems may have obscured a responsive subgroup, and she notes that pediatric oxytocin has looked relatively safe.

7. Vasopressin looks like the stronger bet
Parker says that if she had to bet, she'd bet on vasopressin. In rhesus monkeys at the UC Davis primate center, naturally 'low social' monkeys, which she stresses don't have autism, could be classified almost perfectly by vasopressin in cerebrospinal fluid (CSF), though not in blood. Levels were stable within individuals over time, a requirement for a biomarker. In autistic children, CSF vasopressin tracked social symptom severity but not repetitive behavior.

8. Low CSF vasopressin appeared before symptoms
In banked newborn CSF samples, infants who were later diagnosed with autism already had low vasopressin, while oxytocin didn't differ. The samples came from John Constantino, whose team traced about 2,000 paper records. Parker emphasizes it was a small sample that needs replication. She speculates that many susceptibility genes might converge on a few pathways, vasopressin among them.

9. The vaccine–autism idea is not supported
Parker says the original study was debunked: its author lost his medical license over fabricated data and the paper was retracted. Every study she knows of finds no link between vaccination and autism. Most scientists and doctors she knows vaccinate their own children.

EXAMPLES

1. First vasopressin treatment trial in autistic children
In a randomized, double-blind, placebo-controlled trial (17 children on drug, 13 on placebo), intranasal vasopressin twice daily for four weeks improved social abilities on three measures: parent report, clinician evaluation and lab tests. A subset also showed less anxiety and fewer repetitive behaviors. Parker warns that dosing matters and adverse effects could be severe, so no one should try it outside a trial.

2. Voles and day length
Monogamous prairie voles bond and co-parent, unlike meadow voles, where mothers raise pups alone. Parker noticed that male meadow voles housed on winter-like day lengths began hanging out with females and helping with litters. That observation drew her into vasopressin and social behavior.

3. Probiotics in mouse models
In genetically modified mice with social impairments and low oxytocin, giving a probiotic normalized social behavior and raised hypothalamic oxytocin, and in one study vasopressin too. Cutting the vagus nerve blocked the rescue, which shows

the effect runs from gut to brain through the nerve. These are animal findings.

4. Why primate models matter

Thalidomide, a morning-sickness drug, had its toxicity testing done only in mice. Children were then born with severe limb abnormalities. When it was later tested in primates such as marmosets, the defects appeared, and Parker notes that even a single primate test might have prevented the harm. MPTP, the synthetic heroin that caused overnight parkinsonism in people, also had little effect in mice. Monkey social behavior, including affiliative gaze and grooming, maps onto human behavior in ways mouse behavior doesn't.

OTHER RELEVANT

1. Early behavioral intervention still matters

Diagnosis can wait 12–18 months at clinics during critical early windows. That is why Parker wants faster lab-based screening tests, such as blood or CSF biomarkers. Evaluation should come from qualified experts, not self-diagnosis.

2. Neuropeptide treatments need a prescription and trial evidence

Oxytocin spray requires a physician's prescription and isn't approved for autism. Vasopressin results come from a small trial that is being extended to larger groups. Parker suggests stratifying patients by baseline levels.

3. Funding delays have costs

Huberman notes that three to five years of grant writing can stand between a sound hypothesis and a trial, while children age through critical developmental windows.

A Process for Finding & Achieving Your Unique Purpose | Robert Greene

Guest: Robert Greene
Date: 2023-12-04 · Duration: 3:11:18
URL: https://www.youtube.com/watch?v=50BZQRT1dAg

KEYPOINTS

1. Your uniqueness is your main source of power
Greene's case for purpose begins with the fact that your DNA and early experience have never existed before and never will again. Wasting that uniqueness is, to him, the worst thing you can do. Finding your 'life's task' gives you an internal radar: you know what to work on each morning and can cut out distractions and irritations.

2. Childhood 'impulse voices' point toward your grain
Borrowing Maslow's term, Greene says young children clearly hear what they love and hate. Drawing on Howard Gardner's book 'Frames of Mind', he argues the brain usually leans toward one or two forms of intelligence (verbal, logical-mathematical, bodily, social and so on), and you want to work with that grain. Greene himself was obsessed with words from about age six: spelling backwards, anagrams, palindromes.

3. Other people's voices drown out the signal
From about age seven, teachers, parents and then teenage peers replace your own preferences. Many people pick a practical major, then choose work for money, and end up emotionally disconnected. Recovering the signal is 'archaeology': digging for the bones of childhood inclinations. It's easier at 21 and harder at 30 and beyond, but possible. Greene didn't find his exact path until 38 or 39.

4. Emotional engagement multiplies learning speed
When you care, Greene says, the brain learns two, three or four times faster. Discipline for boring tasks also comes easier once the work connects to your core inclination. A purpose doesn't dictate a job at 28; it gives a direction within which you can experiment through your 20s.

5. Frustration and anxiety are data
Signals of frustration or unhappiness in a career are telling you something about direction, but only if you understand why you feel them. That self-awareness can return even a 30-something to an early inclination. A child forced through a subject they hate can be turned off learning in general, so an early experience of loving to learn matters.

6. Handling anxiety is the core skill of thinking
Insecure people latch onto the first easy answer to escape the discomfort of not understanding. Strong thinkers tolerate the anxiety and cycle on: maybe A, then no, maybe B, refining an idea, sometimes into its opposite, until it becomes 'alive'. Greene adds self-awareness of your biases (confirmation, conviction, recency) and your dark side. He worries AI will short-circuit this process.

7. The sublime lies just outside the circle of convention
Every culture draws a circle of acceptable thought and behavior. The sublime ('at the threshold') is what lies just beyond it, and a near-death experience is the quintessential example. Greene argues that because we alone are conscious of mortality, we are wired for transcendent experiences, and the immersive flow of deep work is one of them. False versions are attempts to 'kill time' through passive consumption or substances.

8. Power and seduction are unavoidable social skills
Greene says most of 'The 48 Laws of Power' is about defense against manipulators and classic mistakes like outshining the master. If you want to move people toward your ideas, you need subtle psychology. Simply venting your views means you care more about expressing frustration than getting results. He contrasts power dynamics with 'love sublime', a rare connection beyond ego games.

9. Mentors are chosen 'surrogate parents'
You can't choose your parents but you can choose mentors, and you move on when you outgrow one; doing so violates nothing. Following someone online is easy, while a real mentorship takes social courage to ask face-to-face. You absorb a mentor's energy and spirit nonverbally, not just their ideas. Huberman described building a composite of role models, keeping a notebook of names since his freshman year of college.

EXAMPLES

1. Einstein's compass, Jobs's shop window, Woods's garage
Greene's examples of early 'seeds': four-year-old Einstein mesmerized by invisible forces moving a compass needle, young Steve Jobs hypnotized by electronics in a Burlingame window, and Tiger Woods screaming with joy watching his father hit golf balls.

2. Four years of French vs. one month in Paris
University French left him unable to speak a word in Paris. Wanting to live there and needing French to talk with his girlfriend, he learned more in a month than in four years of classes.

3. The plaid shirt and the stroke
On August 17, 2018, while Greene was driving, a blood clot in his neck caused a stroke. His wife called 911, paramedics cut off his birthday plaid shirt (later stitched back together), and the clot was cleared. He recalls about 10 minutes feeling like 10 seconds, his sense of self dissolving into 'fifty selves', and a vision of watching his wife and mother from above. He caveats that memory may be distorting these recollections.

4. Death ground

From Sun Tzu: an army with its back to the sea fights ten times harder. Greene cites William James on 'second wind' and the book 'Bone Games', about a climber who, gravely injured on a ledge before a storm, descended 'like a mountain goat' and spent 20 years trying to recapture that energy.

5. Ignoring outrage feeds

Greene stopped opening Nextdoor, whose algorithmic crime headlines made his neighborhood feel like 1980s Beirut. On Ukraine, which he'd recently visited, he limits reading to rational analysis and donates instead of stewing in outrage.

OTHER RELEVANT

1. Practice the 'art of ignoring'

Separate injustices you can act on (voting, organizing, joining a cause) from content that only drains you. Purpose works as a filter here, just as it simplifies choices about food, media and time.

2. Create your own death ground

Remember that you could have a stroke or lose your job tomorrow. Greene argues that the 23-year-old who feels endless time wastes it, while urgency brings focus and energy.

3. Find gratitude in limitation

After the stroke, tying his shoes took about 10 minutes and he could no longer hike. He now treasures three to four hours of writing a day and garden butterflies he once ignored.

4. Meet people in person

Nonverbal skill is a muscle built in bars, restaurants and social events. App profiles and filtered photos deprive you of data and make it easier to deceive others and yourself.

How to Unlock Your Potential, Motivation & Unique Abilities | Dr. Adam Grant

Guest: Dr. Adam Grant
Date: 2023-11-27 · Duration: 3:12:22
URL: https://www.youtube.com/watch?v=3gtvNYa3Nd8

KEYPOINTS

1. Procrastination is emotion avoidance, not laziness
Grant says the research is clear that procrastinators are not dodging effort — people often clean their whole house to avoid a task. What they avoid is the negative emotion a task stirs up: boredom for him (he delays admin, scheduling and grading), fear, anxiety or impostor feelings for others, or confusion about where to start. Naming the specific emotion is the first step.

2. Strategic delay isn't procrastination
Procrastination is technically delaying despite an expected cost. Huberman described waiting for a deadline because time pressure sharpens his focus; Grant said that is a strategy, not procrastination, because he sees a benefit rather than a cost. Grant himself is a 'precrastinator' who finished his thesis months early.

3. Moderate procrastination produces the most creative ideas
With doctoral student Jihae Shin, Grant found an inverted-U: people who procrastinate sometimes were rated more creative than rare or chronic procrastinators. Diving in immediately locks you into first ideas with no incubation; chronic delayers rush the easiest idea at the last minute. The middle group still has time to use ideas that kept working in the back of their minds.

4. The creative benefit requires intrinsic interest
Moderate delay only fuelled creativity when people were intrinsically motivated by the problem. If a topic bores you, you never open the folder, so there is no background processing or unexpected connections. Grant now starts projects early but won't commit to an idea until it has incubated for weeks — for a book, at least a month before drafting.

5. When the work isn't interesting, borrow motivation from purpose
Not every task can be made intrinsically motivating. Curiosity drives the 'how'; purpose comes from the 'why'. Grant cites 'boring but important' research in which students who saw how learning would let them help others studied more persistently and earned better grades. For a dreaded chore, connect it to an outcome you care about.

6. Ask for advice, not feedback
Requests for feedback attract cheerleaders, who applaud your best self, and critics, who attack your worst. Asking 'what advice do you have for next time?' turns people into coaches who look forward and name something to repeat or fix. Grant cites a meta-analysis by Kluger and DeNisi spanning a century of research: feedback helps when it focuses on the task rather than on the self, whatever its tone.

7. The 'I'm not biased' bias is the mother of all blind spots
Emily Pronin's research on the bias blind spot shows people believe they are more objective than others, which blocks them from seeing any bias at all. Grant notes that people who score high on cognitive ability tests can be more prone to it, having been told all their lives they think well. We are also blind to our own strengths.

8. Task order changes how good you are at the next task
A colleague's experiment and field data showed a contrast effect: the more passionate you are about task one, the worse you perform if task two is boring. Grant stopped starting his day with the most exciting work. He now opens with a moderately interesting warm-up and saves an exciting task to look forward to.

9. Potential depends on three underrated character skills
Grant's list: becoming a 'creature of discomfort' (seeking out the awkward and unpleasant), being a sponge that absorbs and filters information, and being an imperfectionist who knows when to aim for excellence and when good is enough. Instilling a growth mindset isn't enough without scaffolding: temporary support that is gradually removed as you learn to climb on your own.

EXAMPLES

1. YouTube-tempted procrastination experiment
To randomly assign procrastination, participants doing creative tasks had one, four or eight entertaining YouTube videos on screen. Those tempted moderately generated the most creative ideas — a lab replication of the inverted-U first seen in survey data from a Korean company.

2. Leslie Perlow's 'quiet time' engineers
Engineers given protected no-interruption blocks before noon (Tuesday, Thursday and Friday in one version) showed 65% above-average productivity. Grant says the days don't matter; the shared commitment to a boundary does. He suggests protecting the first and last hours for deep work and putting meetings after lunch, when people were about 30% less likely to multitask.

3. 72 email checks a day
Citing Gloria Mark, Grant says the average person checked email 72 times a day before COVID. Brigid Schulte calls this 'time confetti': uninterrupted time sliced into fragments that kill both output and enjoyment.

4. The Air Force generals and the 'second score'
At around 25, Grant taught generals and colonels, led with his credentials, and got brutal reviews ('more knowledge in the audience than on the podium'). Using Sheila Heen's 'second score' — rate yourself on how well you take the first score — he opened the next session with 'what could I learn from a professor who's 12 years old?' The room laughed, and the feedback was night-and-day different.

5. The daughter who gave advice back

Before a play, Grant's shy daughter asked for advice, and he asked what she had told him weeks earlier: look for a smiling face. Grant calls this the 'coach effect'. Lauren Eskreis-Winkler's work shows that people randomly assigned to give advice end up more motivated and confident than those who receive it.

OTHER RELEVANT

1. Use a 0–10 rating and many reviewers to filter criticism

Grant asks several people to rate an idea from 0 to 10 (no one says 10). Sevens and eights mean refine it; twos and threes mean rethink or reposition it. Getting more reviewers stings less, because idiosyncratic comments stand out from problems five people share.

2. Keep a 'to-don't' list

Grant's list includes no scrolling social media and no phone after 9 p.m.; he opens apps only to post or read comments. He keeps it in a Word document. Both he and Huberman favour handwritten notes for capturing ideas.

3. Do a reflected best-self portrait

Ask 10–20 people from different parts of your life for a story about when you were at your best, then look for patterns. It reveals strengths you overlook because they come naturally.

4. Set a failure budget

Grant aims to start at least one project a year that doesn't succeed. Succeeding on 90% of projects is a great year; 100% means you aimed too low. Confidence comes from doing, not before it — which is how he decided to start his podcast despite doubts.

5. Taper after peak experiences

Huberman described a stadium-level musician friend who does a menial task, even cleaning up at the venue, right after leaving the stage, so ordinary life at home doesn't feel jarring.

Female Hormone Health, Fertility & Vitality | Dr. Natalie Crawford

Guest: Dr. Natalie Crawford
Date: 2023-11-13 · Duration: 3:27:33
URL: https://www.youtube.com/watch?v=EhIIkzJwPlk

KEYPOINTS

1. Women have the most eggs before birth and lose them steadily from then on
Crawford, a reproductive endocrinologist and infertility specialist who also holds a nutrition science degree, explains that a female fetus has about 6–7 million eggs at around 20 weeks of gestation. More than half are gone by birth. She compares the ovary to a vault: a group of eggs leaves it every month for life, more of them when more remain, and only one is usually ovulated.

2. AMH estimates ovarian reserve, but the pill can lower the reading
Anti-Müllerian hormone (AMH) is made by the granulosa cells around each follicle: more eggs in the vault means higher AMH. Long-term birth control pill use suppresses those cells and can make AMH read up to 30% lower, which is fully reversible. A low result on the pill needs interpreting, sometimes by stopping the pill and retesting.

3. The fertile window is five days ending on ovulation day
Sperm can survive about 5 days and the egg about 24 hours. The day before and the day of ovulation give the best odds. Daily sex during the window gives the highest chance per cycle, but if that causes stress or burnout, Crawford suggests sex every other day from 5–6 days before expected ovulation, aiming for the day before and the day of ovulation.

4. Smoking, vaping and heavy drinking harm egg quality
Cigarettes deplete the egg supply, bring menopause earlier and raise the risk of eggs with abnormal chromosomes by disrupting the meiotic spindles that separate chromosomes. Vaping chemicals are linked to lower IVF success. Chronic alcohol drives inflammation that affects both eggs and sperm, and Crawford says the only acceptable amount during pregnancy is zero. Huberman cites a survey in which 15% of American women reported using cannabis during a known pregnancy.

5. The pill has real benefits and real risks
Because you don't ovulate on the pill, the ovary goes through less of the repeated healing that can give rise to ovarian cancer, and long-term use sharply cuts that risk. The pill raises clotting factors, so it's avoided in smokers and people with high blood pressure. Testing for Factor V Leiden is an inexpensive blood test but isn't routine before prescribing.

6. Egg numbers and quality fall steeply after 37
Both egg count and quality drop more profoundly from about 37. Crawford urges anyone planning two or three children starting at 35–36 to check AMH, the sperm and the fallopian tubes early. Later family starts, chronic illness, autoimmune disease and obesity are pushing infertility up as birth rates fall.

7. Egg freezing technology has improved dramatically
Ten years ago only about 40% of frozen eggs survived thawing, versus about 90% today. Embryos, made of many cells, survive better still. Egg freezing and IVF involve the same retrieval and differ only in what the lab does afterward. Freezing sperm costs around $400 and is far simpler. Problems from older paternal age become clear around 50.

8. Menopause means low estrogen, and early hormone therapy is now recommended
Menopause, on average at 51–52, brings higher risks of dementia, osteoporosis, heart disease, stroke and death, plus hot flashes and vaginal atrophy. Crawford says OB-GYNs now recommend hormone replacement started at the onset of menopause. The harms reported in the Women's Health Initiative study came largely from women who had gone 10 or more years without estrogen before starting hormones.

EXAMPLES

1. From 20 eggs to a baby
In Crawford's illustration for a 30-year-old: 20 eggs, 18 survive thawing, 14 fertilize and 7 become blastocysts. About 60–70% are expected to be genetically normal, perhaps 4 embryos. Each healthy embryo gives up to about a 65% chance of live birth, compared with a natural peak of about 20% a month. Transferring one embryo at a time gives each the best chance.

2. Lavender, tea tree and evening primrose oils
These oils can act like estrogen. Regular exposure can cause breast-bud development in young boys and early secondary sex signs in girls, which a pediatric endocrinologist can tell apart from true puberty, for example with a bone age check. A one-off handwash is different from daily use, and she suggests unscented detergent, shampoo and soap for children.

3. Crawford's supplement suggestions when trying to conceive
Alongside a prenatal vitamin: about 1,000 IU of vitamin D (her clinic screens levels), about 1 g of omega-3s for inflammation and fetal brain development, and CoQ10 at 200 mg three times a day to support mitochondria in eggs and sperm. For men with abnormal sperm tests she adds about 1 g of L-carnitine with 1 g of vitamin C.

4. INVOcell, a lower-cost IVF option
For women who don't ovulate (for example PCOS that doesn't respond to medication) or whose fallopian tubes are blocked by chlamydia or endometriosis, INVOcell aims for a lighter stimulation that retrieves 8–10 eggs. The eggs go into a small plastic device with sperm in a central chamber. The device is held in the vagina with a diaphragm, so the body serves as the incubator, which makes IVF more affordable.

OTHER RELEVANT

1. Myo-inositol for PCOS, and a note on metformin

In PCOS, insulin resistance drives testosterone production by the ovary. Myo-inositol, the main active form in most blends, improves insulin sensitivity and may reduce inflammation. Crawford notes that metformin can lower testosterone, which matters for men taking it or berberine for longevity.

2. Eat whole foods, including fruit and grains

Crawford says fruit doesn't deserve its bad reputation, since its fiber and antioxidants reduce inflammation. Whole grains supply fiber unless you have celiac disease or gluten intolerance.

3. Signs of perimenopause

Longer stretches of low estrogen can bring brain fog, fatigue, more headaches, hot flashes, low libido, vulvar and vaginal symptoms and low mood. These are worth raising with a doctor rather than putting up with.

Mental Health Toolkit: Tools to Bolster Your Mood & Mental Health

Date: 2023-10-30 · Duration: 2:04:11
URL: https://www.youtube.com/watch?v=CJIXbibQ0jI

KEYPOINTS

1. Mental health starts with the 'big six' biological pillars
Drawing on Dr. Paul Conti's 'first principles of self-care' and Dr. Lisa Feldman Barrett's work, Huberman names six pillars: sleep, light (now 'light and dark'), movement, nutrition, social connection and stress control. These keep the autonomic nervous system and neuromodulators working well, and they make the psychological tools later in the episode work better.

2. Treat sleep as a lifelong practice
Aim for as much good-quality sleep as possible on most nights, but don't be neurotic about it. Sleep is something you'll work on for the rest of your life, like fitness. After a poor night, get back on track the next night instead of worrying about it.

3. Get morning light and real darkness at night
Get sunlight in your eyes for about 10 minutes on clear mornings and 20–30 minutes on overcast ones, plus some light in the late afternoon. Even heavy cloud lets through far more light than indoor lighting. A study in Nature Mental Health measured light exposure in more than 85,000 people. It found that daytime light and nighttime darkness each independently predicted better outcomes for depression, bipolar disorder, PTSD and other conditions. Huberman suggests 6–8 continuous hours of very dim light to darkness in every 24 hours.

4. Movement and nutrition basics
Huberman suggests about 180–220 minutes of Zone 2 cardio a week (a pace where you can still hold a conversation), getting your heart rate very high at least once a week, and resistance training. For nutrition he avoids diet wars: whatever your eating style, get enough, but not excess, quality calories.

5. Limit social interactions that drain you
Barrett points out that nervous systems regulate each other, including between people and pets. People who leave you feeling taxed or upset disrupt your physiology as well as your mood, so limiting those interactions protects mental health.

6. Lower stress in real time and raise your threshold for it
The physiological sigh is a full inhale through the nose, a short second inhale to fully inflate the lungs, then a long exhale through the mouth. One, sometimes two or three, quickly lowers stress. To raise your threshold, get into a cold shower for about a minute: the adrenaline surge is unavoidable, and practicing staying calm under it trains you for real-world stress.

7. The brain runs on prediction, so routines support mood
Barrett describes the brain as managing a 'body budget' by predicting what's coming. Your 'affect' (arousal, hormones and other bodily signals) colors how you feel. Keeping the six pillars consistent makes your bodily states more predictable, which helps stabilize mood.

8. Medications open a window for neuroplasticity
SSRIs, Wellbutrin and psilocybin, which is chemically similar to serotonin, all act on neuromodulator systems. Depression is not simply a serotonin or dopamine deficit, though. Huberman frames these drugs as tools for opening up the brain's ability to rewire, which is why he stresses combining them with talk therapy that works on the real-life and historical causes.

EXAMPLES

1. Name emotions more precisely (emotional granularity)
Two experience-sampling studies, one in depressed people and one including Barrett with healthy adults, prompted people several times a day to report what they felt. Labeling emotions more precisely improved emotional processing and well-being. Precision cuts both ways, since dwelling in detail on negative emotions can intensify them. Huberman recommends rich labeling of positive emotions and treating negative ones as information, while taking clinical depression or anxiety seriously.

2. Five minutes of cyclic sighing a day
In a study published in Cell Reports Medicine, five minutes a day of repeated physiological sighs, done at any time of day, improved mood around the clock and reduced anxiety, producing the best results of the practices compared. Heart rate variability, which rises with exercise, sleep and long exhales, ties breathing to emotional state.

3. Build a self-concept with age-by-age folders
From the Conti series: create a folder for each period of your life (for example ages 6–11 or 25–30) with bullet points about where you lived, schools, influential people, key experiences, relationships and struggles. Huberman's own notes include teachers' names and a summer camp that changed him. The aim is a structured story of yourself that informs the present and the future, not an autobiography.

4. Explore the unconscious through dreams and the moments after waking
Late-night REM dreams carry more emotion. On waking, lie still with your eyes closed to recall a dream better, then jot down its themes and watch for ones that recur over weeks. You can also spend 1–5 minutes after waking with your eyes closed, simply noticing where your thoughts go.

OTHER RELEVANT

1. Free-association journaling
Write whatever comes to mind for 5–10 minutes, daily or a few times a week. These notes are only for you, so forget handwriting and how it reads. Huberman describes a second, more structured style of journaling as well.

2. Agency and gratitude come from doing the work

Conti's model aims for agency and gratitude in daily life, which lead to peace, contentment and delight. They don't arrive by decision. They come from understanding yourself, your drives and your defenses, such as denial or overwork.

3. Process trauma in full language

Serious trauma should be worked through with a trained clinician. Conti, speaking with Dr. Peter Attia, warns that shrinking the language you use about a trauma to something more palatable feeds guilt and shame and pushes it into the unconscious, where it can resurface as night waking or compulsive thinking. His book is The Invisible Epidemic.

Curing All Human Diseases & the Future of Health & Technology | Mark Zuckerberg & Dr. Priscilla Chan

Guest: Mark Zuckerberg & Dr. Priscilla Chan
Date: 2023-10-23 · Duration: 2:15:32
URL: https://www.youtube.com/watch?v=1Wo6SqLNmLk

KEYPOINTS

1. CZI's goal: help science cure, prevent or manage all disease by 2100
Chan, a physician and educator, frames the Chan Zuckerberg Initiative (launched in 2015) as a bet on basic science rather than on any single disease. CZI does three things: funds scientists, builds software tools and runs its own science through 'Biohubs'. Both stress that CZI won't cure disease itself. Its goal is to speed up the whole field, and its funding is a small fraction of what the NIH spends.

2. New tools usually come before big discoveries
Zuckerberg says their reading of the history of science is that major breakthroughs tend to follow a new way of seeing, such as the telescope or microscope. He argues the next ten years should mainly go to measuring and observing human biology, comparing it to debugging code: you can't fix a codebase you can't step through, and at Meta big projects start with instrumentation.

3. The cell sits between a genetic typo and the disease
Chan's analogy is a recipe with a typo that produces a bad cake: we know the typo (the mutation) and the result (the disease), but not how the chef and oven, the cell's mRNA, turned one into the other. Single-cell work studies how each of the body's roughly 37 trillion cells reads the same DNA differently in health and in disease.

4. Cell atlases plus AI could produce a 'virtual cell'
Since CZI funded methods work in 2017, near-complete single-cell atlases of humans, flies and mice have emerged, far too much data for people to interpret. Large language models (based on the Transformer architecture) are pattern-recognition machines that work on more than words. Trained on cell-atlas data, a model given a cell's state could predict its next states, much as AlphaFold did with protein folding.

5. In-silico experiments still have to be checked in humans
Chan welcomes cheap, fast computer experiments but warns that 'we've basically cured every single disease in mice'. Model systems are relevant but not one-to-one with humans, so predictions must be confirmed in human biology.

6. Biohubs require collaboration across institutions
Proposals had to involve at least three institutions and several disciplines. The call drew 57 proposals from over 150 institutions. Each Biohub has about 50 dedicated staff, independent of the universities, while letting faculty contribute without leaving their posts. CZI runs in five-year cycles: try many models and double down on what works.

7. Chicago Biohub: sensors inside engineered tissue to catch inflammation early
The University of Illinois Urbana-Champaign, University of Chicago and Northwestern are embedding ultra-thin sensors in lab-engineered skin to read what cells secrete and when inflammation starts. Chan notes inflammation drives about 50% of all deaths. They're also studying the neuromuscular junction, whose slowing with age helps explain why older people fall.

8. New York Biohub: immune cells engineered to act as internal microscopes
Zuckerberg calls it a 'cellular endoscope'. The plan is to engineer immune cells that travel to tissues such as coronary arteries, record whether plaque is present and report back, then eventually engineer cells to clean it up. Targets include places the immune system rarely reaches, such as ovarian and pancreatic cancer and neurodegenerative disease. They describe it as a 10–15-year project.

9. CZI leaves drug development to others but backs rare-disease groups
CZI doesn't develop therapeutics itself, though some Biohub teams have spun out startups. Its Rare As One program funds patient advocates to build registries and recruit researchers and drug developers. Chan stresses that 'rare diseases aren't rare': there are over 7,000, and each offers a window into how normal biology works.

10. Social media is best for connection, worst as negative passive scrolling
Zuckerberg separates interacting with people, which he associates with well-being, from passive consumption, which is at best entertainment and at worst relentlessly negative news. Meta defaults under-16 accounts to private and offers parental tools, time-use tools and nudges when teens get stuck on one type of content. He says Meta has at times been 'too paternalistic' about deciding what content is good for people.

EXAMPLES

1. Single-cell methods reshaped the picture of cystic fibrosis
Cystic fibrosis was taught as a CFTR channel defect that impairs mucus clearance. Single-cell analysis of the lung found an entirely new cell type affected by the CF mutation, which Chan says changed how the disease is understood.

2. CELLxGENE: type in a gene, see where it's active
CZI's free tool shows a heat map of which cell types express a gene and pulls up the most relevant papers. A heart researcher might discover the gene also spikes in the pancreas, which suggests new hypotheses, collaborations and possible drug side effects.

3. How Meta reduced clickbait
People clicked on clickbait but then barely read it and didn't report good experiences. Meta adjusted its ranking using usage

signals plus panels of real people rating which stories they found meaningful.

4. Huberman's mixed-reality boxing session

Huberman, who says he hates screen-based workouts, found a mitt-boxing class in the headset engaging enough to forget it was virtual, because he could still see the physical room.

5. Ray-Ban Meta glasses and the privacy light

The second version has a camera about twice as good, crisper audio for calls and podcasts, and a built-in AI assistant. Asked about recording in places like locker rooms, Zuckerberg says the right test is whether a technology makes misuse easier than existing tools. A pulsing white light shows when the camera is on, which he argues is more visible than someone pretending to text while filming.

OTHER RELEVANT

1. Use the safety tools you already have

Huberman, who was surprised by how many filters exist, recommends Instagram's 'restrict' function over blocking in most cases, and Adam Mosseri's weekly Q&As for learning about features. Zuckerberg says most of this education has to happen inside the product, when the relevant moment comes up.

2. Notice your feed's 'gravitational pull'

Huberman compares some content, such as street-fight clips, to highly processed food: engrossing at the moment but leaving you no better off. Animal content, by contrast, leaves him energized. Zuckerberg says the algorithm tries to weigh long-term wants over short-term loops.

3. AI versions of real people should be controlled by them

Zuckerberg says Meta bans impersonation and that any creator's AI assistant should be under that creator's control, because current models can't yet guarantee faithful representation. Meta started instead with fictional personas, such as a chef, fitness guides and Snoop Dogg as a dungeon master he uses for bedtime stories with his daughter.

How to Understand Emotions | Dr. Lisa Feldman Barrett

Guest: Dr. Lisa Feldman Barrett
Date: 2023-10-16 · Duration: 2:39:04
URL: https://www.youtube.com/watch?v=FeRgqJVALMQ

KEYPOINTS

1. Science has no agreed definition of emotion, and none of its proposed building blocks is unique to emotion

Barrett, a distinguished professor of psychology at Northeastern, notes that 150 years of debate haven't settled what an emotion is. The classic definition, a coordinated change in brain, body physiology and face, describes nearly every waking moment, because your face is always moving and your physiology always supports movement. For decades scientists expected each emotion to have a diagnostic 'fingerprint' of heart rate, action tendency and facial expression; the data never bore that out.

2. Facial movements are not universal emotional expressions

A movement is just a movement; an 'expression' is an interpretation someone adds to it. Meta-analyses in Western samples show people scowl only about 35% of the time when angry. That is above chance, but the other 65% of the time they move their faces in other meaningful ways. She calls the classic Darwin-derived face set largely 'Western stereotypes enshrined as scientific fact'.

3. Context, not the face, carries most of the meaning

Your brain reads an entire ensemble of signals (sounds, smells, the scene, your own body), not an isolated face. Babies' cries aren't acoustically specific to hunger or tiredness. A clip of someone crying looks 'sad' until the camera pans out to show a little girl whose dad just came home.

4. Outside Western cultures, the presumed universal faces often fall apart

The wide-eyed gasp Westerners call 'fear' functions in Melanesian culture as a threat or 'war face'. Among the Hadza hunter-gatherers of Tanzania, who have much less exposure to Western norms, people often don't treat facial movements as being about emotion at all. Newborns orient to a face-like configuration, but the first three months are a 'massive continuous tutorial' in learning faces.

5. Emotions are categories the brain constructs to predict what to do next

Barrett's model treats anger or fear as highly variable groupings of instances, closer to verbs than nouns. The brain doesn't create a state and then label it; it builds a category of possible futures from past instances, which starts as visceral and skeletal motor plans (heart rate, breathing, blood pressure, muscles). The emotion is a plan for action.

6. Affect is a low-dimensional summary of your body, distinct from emotion

Your brain regulates your organs constantly but you can't sense that detail. Instead it gives you affect: pleasant–unpleasant and worked-up–calm, a barometer that is always present in the foreground or background. Emotion is the story the brain tells about what caused those sensations and what to do. Interoception is the brain's model of the body's state, not your awareness of it.

7. Your brain runs a 'body budget' (allostasis)

Rather than money, the brain budgets glucose, salt, oxygen and water. Sleep and food are deposits; trusted company is 'savings' that makes everything slightly cheaper metabolically. Unpleasant affect often signals a deficit, though not necessarily a problem: discomfort roughly 10–20 minutes into hard exercise just means you are working hard.

8. Barrett frames depression as a bankrupt body budget and a metabolic illness

Its symptoms (fatigue so severe you can't move, distress, lack of positive anticipation) map onto metabolic deficit; learning from pleasant surprises is expensive, so a depleted brain doesn't notice them. She cautions that SSRIs may 'juice the system' at first, but for some people the nervous system later adjusts, so they stop working and weight gain follows. Huberman adds an unpublished view among psychiatrists that SSRIs may deplete mood-supporting systems over time, a possible link to 'treatment-resistant depression'. Both present this as a hypothesis, not established fact.

9. Emotional granularity: finer categories give better predictions

Barrett coined the term almost 30 years ago and stresses it is a process, not a trait. Using 'bad' makes the brain construct a whole library wing of options; 'angry' is a bookcase and 'frustrated' a shelf. Words are compressions, like 'pizza' standing in for about 50 sensory features, and you can add new bins, such as the Turkish concept she describes as anger and sadness at a loss together.

10. Being emotionally intelligent includes knowing when not to construct an emotion

Sometimes a stomach ache is better experienced as a stomach ache. We tend to treat negative affect as information about the world ('that driver is an asshole') when it comes from inside us, and sometimes nothing is wrong except too little sleep, food or movement.

EXAMPLES

1. 2016 consensus paper on facial expressions

The Association for Psychological Science asked Barrett and senior scientists who disagreed with each other to review the evidence on universal expressions. Several refused to serve, she suggests partly out of fear for their funding.

2. Death row and 'reading' faces

The Innocence Project intervened in a case where a woman was on death row largely because a police officer claimed he could read her emotions from her face and body. A stay of execution allowed a retrial. Barrett's point is that this kind of evidence wouldn't pass scientific scrutiny, yet juries rely on it to judge remorse.

3. Uncertainty vs anxiety in New Zealand

Days before COVID was declared a pandemic, with one case in New Zealand, Barrett felt intense, unpleasant arousal. She categorized it as uncertainty rather than anxiety, which meant foraging for information instead of freezing or fleeing. She rerouted flights home mid-trip, and the borders closed about two days later.

4. 'Get your butterflies flying in formation'

When her 12-year-old daughter, under 5 feet tall, tested for a black belt against much bigger boys, her 10th-degree black belt sensei didn't tell her not to be afraid; he gave her pounding heart a new meaning: determination.

5. The 'emotional flu' in Stockholm

While her daughter was recovering from depression, a jet-lagged morning looked like the start of another episode. Barrett fed her, gave her ibuprofen and put her back to bed; after five more hours of sleep she was fine. Barrett explicitly says ibuprofen is not an antidepressant. Her daughter coined 'emotional flu' for a bad body-budget day.

6. Social stress taxes a meal

Barrett cites research that being socially stressed within two hours of eating makes the same meal cost the equivalent of 104 extra calories through less efficient metabolism, which she calculates as about 11 pounds over a year.

OTHER RELEVANT

1. Before trusting a bad feeling, check the body budget

Ask whether you're tired, hungry, stiff or in pain. Sleep, a meal with protein, a walk or run, or shifting attention outward all change affect directly. Studies show ibuprofen or Tylenol reduce negative feeling, which shows how physical affect is.

2. Reinterpret arousal as a cue for action

High arousal under uncertainty comes partly from learning-related neuromodulators. Treat it as a reason to gather information, or as determination, not automatically as anxiety. The feeling may not get more pleasant, but it becomes useful.

3. Beware quick 'fixes' that borrow against the budget

Stimulants and alcohol feel like they fix depletion but leave your baseline lower afterward. Huberman and Barrett note some people describe alcohol as a 'magic elixir' before the cost arrives.

4. Be a deposit, not a tax, for other people

'The best thing for a human nervous system is another human, and the worst thing is also another human.' Strangers who trust each other start synchronizing heart rate, breathing and movement within minutes, with healthy interactions alternating who leads. In creative work, trust in your team and managers is the best predictor of performance once sleep and food are accounted for. Random acts of kindness, like Barrett baking bread for her neighbor, benefit the giver's body budget too.

How to Increase Your Willpower & Tenacity | Huberman Lab Podcast

Date: 2023-10-09 · Duration: 2:07:59
URL: https://www.youtube.com/watch?v=cwakOgHIT0E

KEYPOINTS

1. Tenacity and willpower are not habits
Huberman separates them from habit execution, which is reflexive. Tenacity and willpower are what it takes either to do something you don't want to do by default, or to resist something you do. He puts tenacity and willpower at one end of a continuum and apathy and depression at the other. Motivation is the engine that moves you along it. 'Just do it' or 'just don't' fails sometimes for everyone, he says, even David Goggins or Courtney Dauwalter.

2. Everything rides on autonomic function
Whatever the theory, willpower drops when you're sleep-deprived, in physical or emotional pain, hungry, sick, overtrained or ruminating, such as replaying an argument or ignoring a splinter in your foot. No simple metric yet tracks sympathetic–parasympathetic balance; resting heart rate gives only a hint. Without sleep and stress management, he says, the later tools won't help much.

3. The ego-depletion experiments
Roy Baumeister's group placed participants in a room with radishes and the smell of freshly baked cookies. Those who had to resist the cookies then gave up sooner on a puzzle that, unknown to them, couldn't be solved. Those who only resisted radishes persisted much longer. This produced the idea that willpower is a limited resource that gets depleted.

4. Glucose as the limiting fuel, and why it's controversial
Because the brain is among the body's most metabolically active organs and runs mainly on glucose (or ketones on a ketogenic diet), Baumeister's group proposed blood glucose as the depleted resource. Replications and meta-analyses split. Some confirm the effect and others refute it, partly over statistical power.

5. Beliefs change the effect of glucose
In a PNAS paper titled 'Beliefs about willpower determine the impact of glucose on self-control' from Carol Dweck's group, participants did back-to-back Stroop-style tasks with a sugar drink or a taste-matched artificially sweetened drink. Glucose improved performance only in people who believed willpower is a limited resource. Those who saw it as non-limited performed well without the glucose.

6. Baumeister's rebuttal
With three or more demanding challenges in a row, rather than two, sipping glucose did help sustain performance, even though his group conceded that beliefs matter. Huberman says the tools work whichever camp you're in.

7. The anterior mid-cingulate cortex (aMCC) is the hub
Over two dozen studies point to this paired frontal-lobe structure, about a third of the way back from the forehead. It is more active in successful dieters and smaller or less active in obesity and clinical depression. Super-agers, people over 60 with the cognition of people decades younger, have a larger aMCC than their peers. In anorexia nervosa it is hyperactive at rest and when presented with food. Lisa Feldman Barrett's lab framed it in a review titled 'The tenacious brain'.

8. Allostasis: allocating resources toward goals
The aMCC receives inputs from autonomic, motor and dopamine and serotonin reward systems. Huberman frames it through allostasis: beyond keeping balance (homeostasis), the brain allocates bodily resources toward goals. It can trigger and respond to dopamine release.

9. Hard things, not easy ones, build it
In Colcombe and colleagues' 2006 study, 60- to 79-year-olds did three one-hour sessions a week of aerobic training for six months, working up to about 60–75% of maximum heart rate (roughly zone 3). Their aMCC and anterior white matter held steady or grew. A stretching and calisthenics group of equal time showed no such change and no VO2 max gain. The new exercisers had to summon effort; Huberman's point is that if you already train, you need to add something harder.

10. Reward yourself after the hard thing
A recent animal study in Neuron described stress relief as a natural resilience mechanism. The relief after a stressor ends is itself rewarding, and adding a reward afterwards increased the ability to get through future stress. Huberman suggests occasionally rewarding yourself, in healthy ways, after doing the hard thing.

EXAMPLES

1. 'A storm in the distance'
Stanford's Josef Parvizi stimulated the cingulate of awake surgery patients (Neuron, 2013, 'The will to persevere induced by electrical stimulation of the human cingulate gyrus'). aMCC stimulation produced a feeling of a storm ahead that the patients had to go into and knew they could get through, along with changes in heart rate and breathing. Sham stimulation produced nothing.

2. Micro-sucks
Pick small, safe things you don't want to do: one extra set, 100 jumping jacks after a hard run, a cold shower or plunge when you'd rather go home, five minutes of sitting still to review a language lesson instead of grabbing your phone, or not checking texts during a workout.

3. Build on a strength baseline
Huberman cites a working minimum of about six hard sets per muscle group per week to maintain or build strength. He notes a strong correlation between muscle strength and cognitive function, especially with age. Once that is routine, micro-sucks

layered on top keep challenging the aMCC.

4. Learning something hard as an adult

Taking up an instrument or a second or third language engages the aMCC, but only if it's genuinely a challenge you resist. Reflexive habits don't.

5. Problems with no answer

Huberman recalls graduate qualifying exams in which examiners kept asking until he said 'I don't know'. Endeavors with no finish line, in martial arts, music, academics or relationships, keep building tenacity, and super-agers are always engaged in something hard.

OTHER RELEVANT

1. Sleep and stress first

Fix sleep before adding willpower drills, since autonomic depletion undercuts everything else.

2. Check your beliefs

Treating willpower as non-limited may help you through back-to-back challenges. For long strings of demanding tasks, fueling may still matter.

3. Know when to turn it off

Huberman notes that, as in eating disorders, we also need to learn to switch this resistance system off.

AMA #11: Improve Task Switching & Productivity and Reduce Brain Fog

Date: 2023-09-29 · Duration: 0:34:36
URL: https://www.youtube.com/watch?v=7Ey_vTTgJGc

KEYPOINTS

1. Task switching is distinct from cognitive flexibility
Huberman explains that the prefrontal cortex, really a collection of subregions, lets us apply context-specific rules. A high-school student, for example, follows different rules in math class than in history, and different teachers allow different behavior. Cognitive flexibility is the ability to change the kind of mental operation you're running. Task switching depends on that flexibility but is a narrower skill: stopping one activity and fully engaging in another.

2. How labs study task switching
In typical experiments, people perform one mental task, such as counting up in sevens or in alternating steps of seven plus one and seven minus one. At a tone or a fixed interval, perhaps every 10 minutes, they must switch to a different cognitive task. Other studies switch between manual tasks, such as fitting puzzle pieces. Fewer studies look at switching between physical and mental tasks.

3. Expect 5–10 minutes before focus arrives
Unless material grips you, such as a text you're eagerly awaiting or directions to find a friend in a busy city, the circuits needed to understand and remember a book chapter, spreadsheet or tax form take about 5–10 minutes to reach the activity level you experience as focus. Huberman says many people wrongly blame themselves for poor attention because they expect instant immersion. He adds that he can't rule out clinical ADHD for anyone.

4. Switching is push-pull: some circuits ramp up while others quiet down
Moving to task B requires engaging new neural circuits and disengaging or letting fade the ones that served task A. He compares this to dimming the lights in one room while brightening another. The same applies to physical work: no one expects peak lifting or cycling performance without a warm-up, or while still replaying the conversation they had on the way in.

5. Insert a deliberate transition period, even 15 seconds
Huberman describes findings that even a short, arbitrary transition, one you consciously label as transition, leads to more complete and efficient engagement in the next task than switching straight across. He calls this a top-down effect: knowing why the gap helps lets you use it, with no drug or supplement needed.

6. Scale the gap to how deep you were
After light work, such as email, a routine meeting or chatting with a coworker, a minute or two is enough. After deep immersion, give yourself 5–10 minutes if you can. If time is short, any designated transition helps, even 60–90 seconds, or just a 10-second count from 10 down to 1.

7. Bring in no new information during the gap
The key ingredient is the absence of new input. Checking your phone, texting, social media or any other 'foraging' is itself a task: images, videos and new ideas anchor attention and will intrude on task B. His advice is to avoid turning A-to-B into A-to-C-to-B. He isn't anti-smartphone. He uses his phone often between bouts of focus, just not in these windows.

8. Visual focus and time perception are linked
Where you place your visual attention changes how finely your brain slices time. Attending to your body or nearby space resembles high-frame-rate, slow-motion video (fine slicing), while gazing at the horizon slices time more coarsely. Different tasks, like a Zoom meeting versus lifting weights or reading, also run in different time domains, so switching tasks partly means switching time scales.

9. A daily perceptual drill to train switching
Huberman does a 2–3 minute 'space-time bridging' practice most mornings. He frames it as a visual perceptual exercise, not meditation. Moving attention through near-to-far 'stations' trains the brain to shift visual focus and time perception, and makes you aware of how transitions feel. He thinks even once or three times a week helps.

EXAMPLES

1. How to do the drill
Eyes closed, attend to body sensations or breathing for about 5–15 seconds. Eyes open, focus on your hand for 5–15 seconds. Then look about 10 feet away, then about 50 feet away, then as far toward the horizon as possible, holding each spot for 5–15 seconds while keeping some awareness of your breathing. Finish by closing your eyes and returning to your immediate surroundings. A view from a balcony or outdoors is ideal, and the distances needn't be precise.

2. Chess boxing as extreme switching
In this real sport, opponents alternate rounds of chess with boxing rounds of roughly one to three minutes. Huberman cites it as task switching at its most extreme and explicitly does not recommend it.

3. Huberman's own struggle
He drops into deep focus easily but struggles to leave it, which is why he sometimes runs late. As a new assistant professor writing grants, he'd get two lines down before a knock at the door about syringes or buffers pulled him away.

4. The three-things list
While he was a master's student at Berkeley, a professor told him he wrote down no more than three critical tasks each day. Routine activities like cycling to campus, running or the gym didn't count. Huberman still lists one to three demanding tasks per day, and leaves the rest of his day to automatic routines.

OTHER RELEVANT

1. Don't do the drill while driving

He considers space-time bridging very safe and free, but says not to do it while driving or operating machinery.

2. Tune out lab or office distractions

From years in busy labs, he says getting good at your craft includes learning not to join the crowd around a screen (say, a World Cup score) when you're moving between focused tasks. He still encourages socializing, such as chatting in the hallway after a meeting.

3. Coverage note

The freely available portion of this AMA addresses only task switching. The brain-fog and productivity topics in the title are covered in the members-only remainder.

Dr. Paul Conti: How to Build and Maintain Healthy Relationships | Huberman Lab Guest Series

Guest: Dr. Paul Conti
Date: 2023-09-20 · Duration: 3:04:37
URL: https://www.youtube.com/watch?v=eMqWH3LYiII

KEYPOINTS

1. Healthy relationships start with a healthy self
Conti, a psychiatrist, builds on the model from earlier episodes in this series. The structure of self (character structure, defense mechanisms, what is salient) and the function of self are worked on with curiosity to build empowerment and humility. Those come together in 'agency and gratitude' as verbs. A healthier person, he argues, also recognizes unhealthiness in others, which protects against bad pairings.

2. You cannot predict 'us' from two lists
Relationships show 'levels of emergence': something new arises from the combination that no one can know in advance, even with extensive knowledge of both people. Points of compatibility matter for concrete deal-breakers, such as one person absolutely wanting children and the other absolutely not. But checklists, attachment labels and love languages miss the heart of the matter.

3. Match on generative drive, not surface interests
The generative drive is a set of potentials: the drive to learn, create and spread goodness, inwardly and outwardly, shaped by genes and formative experience but changeable. Two people who both love music can grow together if their generative drives are healthy. If one's aggressive drive dominates, it becomes 'my music is better than yours.' Conti says people rarely look for this in themselves or others, and not doing so causes countless problems.

4. There are three drives to keep in balance
Alongside the generative drive, the aggressive drive includes healthy assertion and proactivity, not just conflict. The pleasure drive covers gratification. Problems arise when the generative drive is low or thwarted, or when assertion is too weak or aggression too strong. Conti distinguishes generative engagement from passive consumption, like reading a great book just to check it off.

5. A trauma bond is not inherently bad
Two people with trauma, for example avoidance that keeps them from crowded places, can reinforce each other's avoidance, which is why the term sounds negative. Conti says the problem is unhealthy drives, not shared trauma. The same pair, if generative, can do together what neither could do alone and leave stronger.

6. 'Repetition compulsion' is not truly compulsive
Conti rejects the word compulsion because these choices can change. Trauma triggers shame and lodges in the limbic system, which 'doesn't care about the clock or the calendar.' So a person may unconsciously seek a similar relationship to make the original one right, as if fixing the present would repair the past. That is why someone can end up in a fourth abusive relationship with 'the same person with a different name.'

7. Narcissism and dependence can lock together
A narcissistic character structure is exploitive, 'a bottomless pit of need arising from vulnerability.' Such a person can survey a room and find someone desperate not to be left. Milder forms of the same pattern appear as attachment insecurity, such as giving up parts of oneself or overworking just so a partner won't leave. Conti stresses that both can be treated.

8. Staying in abuse reflects demoralization, not choice
Outside of extreme oppression, Conti believes people remain in exploitive relationships only when demoralized, with too little drive for assertion. Helping them understand what inside makes change seem impossible, and giving them means, lets them leave.

9. Jealousy can be benign; envy is destructive
In Conti's terms, jealousy says 'you have something I don't, maybe I can work for it,' and can motivate. Envy treats bringing the other person down as equal to lifting yourself, through humiliation, harassment or sabotage. He argues the small fraction of people with envious, narcissistic structures 'does most of the damage on earth,' from hospital and lab hierarchies to wars, and that envy rules out happiness.

10. Power dynamics exist in every relationship, mostly unstated
Power dynamics are not necessarily unhealthy, but most are covert, like an iceberg. Ask honestly what's really going on between us. Can each person raise issues without retribution, even small ones such as coming home late the next day? People often present 'everything is equal' while describing a large disparity.

11. Self first, then other, then the 'magic bridge of the us'
Mentalizing, or understanding another's mind, starts with understanding yourself, since you can't read someone clearly while flooded with your own anxiety. Then consider the other person, then the relationship itself. Distorting defenses such as projection can turn a partner's calm, well-meaning attempt to solve a problem into 'you don't care about me.'

EXAMPLES

1. The friend who walks in without knocking
Conti's boundary walk-through: first check inside whether the behavior bothers you and whether that makes you a bad friend. Settle it with yourself, then communicate warmly: 'I care about you and trust you, but it makes me nervous when people just come in; would you mind knocking?' A blunt 'don't come in anymore' puts the friendship 'on the rocks.'

2. Two avoidant people at the museum

Neither can go alone because of crowds, but together both can. They return with more confidence and pleasure, reinforcing the generative drive. It is Conti's example of a trauma bond working positively through the 'us.'

3. His grandmother's joy in giving

Conti recalls that his maternal grandmother liked receiving gifts but loved giving, and he learned later how much good she did in her community. He also describes a very successful man he consults with who always 'gives a little bit' at the end of any deal. Conti argues the goodness inside explains both his success and his happiness.

4. Kindergarten as the template

Huberman recalls caring adults, snack-time oranges, naps, and a class guinea pig families took home on weekends. Conti agrees that a healthy kindergarten embodies the generative environment: support, care for others and simple goodness that trauma and complexity erode.

OTHER RELEVANT

1. Before dating, work on your own 'map'

Conti rarely sees someone rescued simply by finding a healthier partner. He calls it a 'broken compass' when your choices keep leading you wrong. Examine your defenses and drives so you're drawn to others who have done the same work.

2. Interrupt anxiety before reading others

In conflict, notice your own anxiety and known biases ('I get defensive and read calm as not caring') before interpreting your partner's intent.

3. Lean toward giving

Conti finds the happiest people are givers. Ending exchanges by giving a little more than you take fuels the generative drive.

4. Seek help for entrenched patterns

Repeated abusive pairings, narcissistic traits and pathological dependence are treatable. Clinical care helps people see why change feels impossible.

How to Use Music to Boost Motivation, Mood & Improve Learning | Huberman Lab Podcast

Date: 2023-09-18 · Duration: 1:44:25
URL: https://www.youtube.com/watch?v=gveDhZW-rUk

KEYPOINTS

1. Music both conveys and evokes emotion, and it also signals intent
Low-frequency drumming whose cadence speeds up as it approaches reads as aggression or 'war drums,' whereas other tone patterns signal something entirely different. Unlike words, music carries that intent through the listener's body. It recruits premotor circuits, the neurons that fire just before an action, which is why music so often makes you feel you need to move.

2. The urge to move to music is innate
Babies as young as 3 months respond to music differently than to the same sounds scrambled in time, and they do it with rhythmic movement. Some sound patterns move mostly the torso, others mostly the limbs, and others both, which Huberman compares to the different dancing styles you see at a wedding. This happens before anyone teaches them what music or dancing is.

3. 10–30 minutes of focused listening a day raises heart rate variability, mostly through breathing
Meta-analyses of studies in which people listened only to their favorite genre (rock, classical, country) for 10–30 minutes a day, sometimes up to 60, found lower resting heart rate and higher heart rate variability. The HRV gains lasted around the clock, including during sleep. A review in Trends in Cardiovascular Medicine concluded the effect works mainly through unconscious changes in breathing rather than through sound acting directly on the heart.

4. Respiratory sinus arrhythmia is the link between breathing and heart rate
On a deliberate inhale, the diaphragm moves down, the heart gets temporarily larger, blood moves more slowly through it, and the nervous system speeds up the heart. On a long or forceful exhale, the heart becomes smaller, blood moves faster, and a parasympathetic signal slows the heart. Music makes you inhale in anticipation and exhale on release, so it works these controls without your noticing.

5. Music engages prediction, reward, emotion, memory and movement circuits together
The frontal cortex predicts the next sound. When a prediction is broken in a way you like, the mesolimbic pathway (ventral tegmental area and nucleus accumbens) releases dopamine. A disliked surprise drops dopamine below baseline, which Huberman calls a 'muffin song' that is great at the top and disappointing in the middle. The amygdala drives arousal, the hippocampus and parahippocampal cortex bring back vivid memories, and the basal ganglia and cerebellum handle the urge to move and rhythmic timing.

6. Music faster than about 140–150 bpm increases motivation to move
Fast music shifts the balance between the basal ganglia's 'go' and 'no-go' circuits and releases catecholamines (dopamine, norepinephrine and epinephrine). This narrows the visual field toward a tunnel focus that suits effort. The effect holds whether or not you know the song or its lyrics are motivating; motivating lyrics simply add to it.

7. For learning, silence beats music, and favorite songs with lyrics are worst
In controlled studies of focus-heavy learning tasks, the order of performance was silence, then instrumentals, then music with lyrics, with your favorite lyrical music last. Huberman's explanation is that reading creates an inner narration with subthreshold premotor signals to the larynx, which Eddie Chang has described, and familiar lyrics compete with that narration. Separate studies found white noise, brown noise or 40 Hz binaural beats improved focus compared with silence, but none compared them directly with music.

8. The evidence on binaural beats is mixed
Some decent studies show that 40 Hz binaural beats enhance concentration. Other recent studies found binaural beats impaired cognitive performance, but those used other frequencies. Huberman uses the Brainwave app at times but admits he has never run a controlled comparison on himself.

9. Mood follows tempo more than lyrics
Meta-analyses link 'happy' music to tempos of roughly 140–150 bpm or faster in major keys. Nonsense lyrics lifted mood as much as lyrics about love or friends, which Huberman says explains catchy, mostly upbeat one-hit wonders and why AI may get good at writing hits. 'Sad' music tends to run below about 60 bpm and activates the corrugator muscles that furrow the brow, while happy music relaxes and raises the brows.

10. Learning instruments and singing increases brain connectivity
Children who learn one to three instruments, especially before about age 8, or who sing in a choir or solo, show up to 30% greater connectivity across the corpus callosum, the link between the two hemispheres, and it persists into adulthood. Age 8 is a study cutoff, not a closed window: adults gain from learning an instrument, singing, or attentively listening to unfamiliar music 30–60 minutes about three days a week. Huberman calls the 'left-brained versus right-brained personality' idea nonsense.

EXAMPLES

1. Survey of why people listen to music
About 90% listen to relax, 82% to feel happier, 46.5% to process emotions (most often sadness) and 32.5% to concentrate. People could give multiple reasons.

2. 9 minutes to lift mood, 13 to process sadness
Across studies, the threshold for a significant shift toward happiness was about 9 minutes of upbeat music. People who were

already sad were helped to process it by 13 minutes or more of slow music (about 50–60 bpm or slower), which supports a cathartic 'match the feeling' approach.

3. 'Weightless' by Marconi Union

A study from the University of Pennsylvania reported up to 65% reductions in anxiety after just 3 minutes of this song, comparable to a commonly prescribed benzodiazepine. The top YouTube version runs 10 hours and has around 47 million views.

4. 'Bass face' as a labeled line

Low-frequency tones spaced apart reliably produce a characteristic facial expression, which suggests a dedicated pathway from the ears to the facial muscles. Erich Jarvis argues that such music, dance and song circuits probably came before spoken language.

5. Huberman's violin story

He was assigned the violin as a child and learned with the Suzuki method. In his one concert photo, every other child's bow is up and his is down. He quit and still plays nothing, which he says likely means he missed the childhood connectivity boost. He plans to learn an instrument now, away from people and pets.

OTHER RELEVANT

1. Prime motivation with fast music for 10–15 minutes beforehand

Before a workout or a hard cognitive session, play fast music you like for 10–15 minutes. Then do focused work in silence, with white or brown noise, or with 40 Hz binaural beats.

2. Save lyrical favorites for study breaks

Uplifting familiar songs during breaks between 30–90 minute work bouts appear to improve focus and learning when you return to the work in silence.

3. During exercise, alternate music with silence

Results for music throughout a workout are mixed and individual. Huberman reads the data as favoring familiar, motivating music between sets or at intervals during a run or ride over a constant soundtrack.

4. Use specific tracks for anxiety and low mood

Keep 'Weightless' ready for a 3-minute reset alongside the physiological sigh (two nasal inhales, then a long exhale through the mouth). Use about 9 minutes of upbeat music to lift mood, or let slow music carry you through sadness.

5. Listen to new music attentively

Deliberately seeking out and paying attention to unfamiliar genres, rather than leaving them in the background, appears to support neuroplasticity well beyond music itself.

AMA #10: Benefits of Nature & “Grounding," Hearing Loss Research & Avoiding Altitude Sickness

Date: 2023-08-30 · Duration: 0:21:34
URL: https://www.youtube.com/watch?v=eJU6Df_ffAE

KEYPOINTS

1. Morning sunlight is the best-supported benefit of being outdoors
Huberman says dozens if not hundreds of quality peer-reviewed studies support getting sunlight in your eyes early in the day to set your circadian rhythm. He calls it unequivocally supported: it raises daytime mood, focus and alertness, improves nighttime sleep, and benefits metabolism. The metabolic effect may be direct, but more likely it comes indirectly from better sleep.

2. Light through glass or from a screen doesn't count
You won't set your circadian clock by viewing the sun through a window or windshield, or by looking at an image of the sun on a screen. You don't need to catch sunrise. If you wake after the sun is up, go outside, face it, and blink as needed to protect your eyes, especially on overcast days. Late-afternoon light before sunset adds further benefit.

3. SAD lamps are a fallback, not an equal
If season, latitude or work schedule rules out morning sun, a bright seasonal affective disorder (SAD) lamp viewed for about 5–10 minutes, for example on the counter during breakfast, improves mood, focus and alertness and helps set the rhythm. Huberman stresses it is 'not nearly as effective' as real sunlight.

4. Moving water may help through negative ionization
A peer-reviewed literature, including work from a Columbia University School of Medicine laboratory, links negative air ionization near waterfalls, streams and similar moving water to benefits for circadian rhythm and some aspects of mental and physical health. Huberman hedges heavily: there 'does seem to be' benefit, 'perhaps' because of ionization. Home ionizer machines show some benefits in a few studies, but nowhere near those of time spent outdoors by moving water.

5. Time in nature measurably improves health
Dozens if not hundreds of studies show that 10–30 minutes outdoors, three to seven days a week, significantly reduces blood pressure and resting heart rate and improves sleep and mood. That holds across parks, streams, oceans and other natural settings. Huberman's answer to whether nature is good for you is 'absolutely yes.'

6. Science struggles to isolate what makes nature work
The scientific method relies on testable hypotheses, for example '30 minutes in nature three days a week improves mood and sleep.' But isolating single variables (green color contrasts, calming sounds, wildlife, smells from decomposing soil, air quality, ionization) means bringing people into bare lab rooms with pictures or recordings. Huberman argues that strips away the whole experience, including surprise, and understates nature's value. He thinks the method may never fully answer this one.

7. Grounding has some evidence, but it is weak
Grounding means placing bare feet directly on soil or grass. Proposed mechanisms include electron exchange with the earth's surface, rubber-soled shoes blocking that exchange, and the tactile sensation itself. Huberman notes few of these papers appear in top-tier journals and says there isn't enough quality science to conclude which mechanism, if any, explains the effects.

8. Forest bathing started from controlled Japanese studies
Huberman calls the Japanese forest-bathing studies 'pretty nice': people placed in forest environments for set periods showed better mental and physical health than controls. That prompted people to bring plants indoors. Plants look nice and may add pleasant odors, and Huberman suggests any benefit likely depends on how many there are and how much attention you pay them.

EXAMPLES

1. The squirrel and the pine cone
On a Sunday hike Huberman watched a squirrel about 7–8 inches long hauling a chewed pine-cone cob of 9–10 inches, longer than its own body. The moment delighted him and stuck in memory, alongside a stream's sound, sunlight, color contrast and fresh air far from cars. He uses it to show how many variables arrive at once outdoors and why lab isolation misses them.

2. How grounding has been studied
Some studies brought people into the laboratory to rest their feet on soil contained in a box. Others had people go outdoors and stand barefoot on grass or ground. Both made reasonable attempts to tease apart ion exchange from the feel of the ground, but Huberman says they could not settle which, if either, mattered.

3. An example of a testable hypothesis
A question is 'Is nature good for health?' A hypothesis takes a stance: 'Getting into nature for 30 minutes a day, 3 days a week, improves mood and nighttime sleep.' An experiment then tests it and the data confirm or negate it.

4. Huberman's weekly routine
Every Sunday he does Zone 2 cardio by rucking, jogging or hiking outdoors, often with family or friends. On other days he aims for at least a few minutes outside with a morning stroll and sunlight. If weather or travel makes him miss a week, he makes up for it the following week. He also takes a few inexpensive hiking or camping trips each year.

OTHER RELEVANT

1. Prioritize daily morning outdoor light

Make morning sunlight non-negotiable, add late-afternoon light when you can, and use a SAD lamp only when outdoor light is genuinely unavailable.

2. Aim for 10–30 minutes outside, three to seven days a week

This range matches the studies showing lower blood pressure and resting heart rate and better sleep and mood. Pairing it with exercise, outdoor cardio or even resistance training adds physical benefit. Making it social is optional.

3. Try grounding if you like it, on clean surfaces

Huberman finds barefoot time on clean soil or lawn pleasant and suggests combining it with morning sunlight. Avoid places like dog parks, since hookworm is a real risk.

4. Don't wait for perfect evidence about nature

Huberman's stance is that the overall benefit is clear even if the specific active ingredients, perhaps involving serotonin, dopamine, oxytocin and hormones tied to how our nervous system evolved, remain unknown. Get outside as often as you safely can.

Life, Death & the Neuroscience of Your Unique Experience | Dr. David Linden

Guest: Dr. David Linden
Date: 2023-08-21 · Duration: 2:36:47
URL: https://www.youtube.com/watch?v=29n0WG317tM

KEYPOINTS

1. Krause corpuscles are finally confirmed as the nerve endings for sexual touch
German anatomist Krause described these endings in the penis and clitoris in 1860. They also appear in the nipples, lips, cornea and joint linings, so their role was never clear. A preprint from David Ginty's lab at Harvard showed in mice that they're mechanical sensors. Switching them on with light-activated (optogenetic) tools caused erections, and switching them off reduced mounting and ejaculation in males and receptivity in females.

2. Sexual sensation may vary between people and fade with age
Linden speculates that individual differences in Krause corpuscle structure might help explain why people like different kinds of touch, and that their loss with age could parallel the known age-related loss of fine-touch endings (Merkel and Meissner) in fingertips. He notes that chronic masturbation is known to desensitize the penis, which is more likely a change in receptor function than in structure.

3. Smell is where humans differ most, and it's highly suggestible
We have about 400 functional odor receptors, and any two people differ in about 30% of them (work by Leslie Vosshall's group at Rockefeller). Androstenone smells like nothing, grass or urine depending on a single receptor gene. Linden calls humans the 'anti-pandas': we live everywhere and eat everything, so few smells are innately aversive (exceptions include the rotting-meat compounds cadaverine and putrescine), and most smell preferences are learned culturally.

4. Perception is inference
Linden's broader theme is that no sense delivers an objective world. Smell, taste, sight, balance and fullness are all shaped by experience, expectation and context, which makes it 'almost a miracle' that we agree on a shared reality at all.

5. Early-life experience can set traits that look genetic
Children who spend little time outdoors in their first five years or so are more likely to become nearsighted, because light appears to drive growth factors that control how much the eyeball elongates. Linden calls this 'news you can use': get kids outside. Heat tolerance is another example (see below).

6. Most traits are partly heritable, and heritability depends on circumstances
Wet versus dry earwax (the ABCC11 gene) is 100% heritable, while accent is 0% heritable and comes mainly from peers. Height is about 85% heritable in the US but only about 50% in rural Bolivia or India, where poor nutrition and disease keep people from reaching their genetic potential. IQ shows the same pattern: roughly 60–70% heritable in affluent settings and lower where schooling and care are poor. 'Genes don't code for traits, they code for proteins.'

7. Family environment explains surprisingly little of personality
In the Minnesota Study of Twins Reared Apart, the 'Big Five' personality traits were about 50% heritable, but family upbringing contributed almost nothing to the rest. Linden attributes much of the remainder to the random nature of development: the genome isn't a wiring diagram for trillions of connections. Parents still shape values, religion and career choices.

8. Inheriting trauma through DNA marks across generations isn't proven in mammals
It has been shown convincingly in worms and plants. The human evidence comes largely from famine records in Överkalix, Sweden, which Linden criticizes for having no known mechanism and for running many comparisons without correction (hypothesizing after the results are known). 'You may well inherit your grandma's trauma, but probably socially.' Effects within a single pregnancy are better established.

9. Inflammation and depression are linked, but simple fixes haven't worked
About a third of people with depression benefit significantly from SSRIs, a third slightly and a third not at all. An inflammatory cytokine once used to treat hepatitis C made nearly everyone depressed, and multiple sclerosis (with high IL-6) carries far more depression than spinal cord injury does. Yet giving anti-inflammatory drugs to depressed people in general hasn't helped. There are hints they may help SSRI non-responders, but the evidence is 'right on the edge'.

10. Mind-to-body effects need clear biological pathways
Nerves that grow into melanomas release CGRP, which suppresses the immune cells attacking the tumor and worsens prognosis. Linden floats, and labels as without evidence, the hypothesis that meditation could slow such tumors through a defined neural pathway. He argues researchers should take mind-body claims back from 'nonsense' by testing them rigorously. Breathing rhythms show up throughout the brain, which makes effects of breathwork plausible.

11. The cerebellum predicts the next second or two
The cerebellum is known for motor coordination; damage causes clumsiness and overshooting, not paralysis. Through connections to the thalamus and frontal cortex, its predictive computation also supports social judgments, such as whether someone is a friend or a threat, and other non-motor tasks.

EXAMPLES

1. Japanese soldiers' heat stroke in WWII
Soldiers from cold Hokkaido collapsed from heat far more often than those from subtropical Kyushu. Both groups had the same number of eccrine sweat glands, but southerners had more of them connected to nerves. Children of northern families raised in the south developed the southern pattern, and vice versa: an adaptation set within one lifetime by early experience.

2. Parmesan or vomit?
The same butyric/isovaleric acid mixture is identified as parmesan or as vomit depending on the label, per research Linden credits to Rachel Herz, and people refuse to believe it was the same vial.

3. The 1918 flu and later schizophrenia
Men who were in the womb during the 1918 pandemic were a millimeter or two shorter, and rates of schizophrenia and what we'd now call autism rose about fourfold. Gloria Choi at MIT modeled this in mice: mimicking a viral infection during the first-trimester equivalent triggers an IL-17 surge (interacting with gut bacteria) that crosses the placenta and disorganizes the layers of the developing cortex.

4. Linden's heart cancer
In 2020, breathlessness led to treatment for atrial fibrillation, then the discovery of a Coke-can-sized mass pressing on his heart, and two-day open-heart surgery. It turned out to be synovial sarcoma of the heart, rare enough that only individual case reports exist. Given 6–18 months, he was still alive about 27 months later at the time of this conversation, aged 61.

OTHER RELEVANT

1. You can feel grateful and furious at the same time
Linden was 'white-hot angry' at the diagnosis and deeply grateful for his life in the same moment, which overturned his idea of emotion as a single scale. His gratitude is for 'the very biggest things' (being conscious, following his curiosity, his wife and children), not for small details.

2. Curiosity as agency during illness
During chemotherapy he couldn't talk himself out of low mood, probably because his brain was 'awash in interleukin-6', but noticing that as a scientist gave him a sense of agency. He recommends this 'way of the nerd' only for naturally curious people.

3. Context changes how much time feels like enough
Five years would have seemed a tragedy before diagnosis and a gift after it. Linden argues that because the brain constantly predicts the near future, it can't truly imagine its own absence, which he suggests is why almost every religion has some form of afterlife.

4. Career and life advice
Linden warns that today's hot technique (single-cell profiling) will be passé by the time a five-year PhD is finished, and agrees with the 'deletion test' Huberman credits to Stanford's E.J. Chichilnisky: if others already do something well, pick something else. His universal advice: 'appreciate what you got while you got it.'

Improving Sexual & Urological Health in Males and Females | Dr. Rena Malik

Guest: Dr. Rena Malik
Date: 2023-08-14 · Duration: 2:54:29
URL: https://www.youtube.com/watch?v=F54qXuTpgfM

KEYPOINTS

1. Many people need to relax their pelvic floor, not strengthen it
Malik, a urologist, explains that the pelvic floor muscles control both urination and sexual function. A common problem, especially in people who sit for long periods, is a pelvic floor that's too tight and short rather than too weak, and it can cause pain, urinary symptoms and sexual dysfunction. Huberman's own experiment with Kegels quickly left him with painful urination.

2. Kegels help some people and harm others
A Kegel means squeezing the muscles you'd use to stop your urine flow (not while actually urinating) and then fully relaxing. For men, the cue is lifting the penis without touching it. Kegels are mainly prescribed for stress urinary incontinence, leakage when coughing, sneezing, lifting or jumping. Doing too many creates a tense pelvic floor. Malik recommends a pelvic floor physical therapist to check your technique.

3. Hormones cause only a small share of sexual dysfunction
Only about 3–6% of erectile dysfunction is hormonal. Most problems involve blood flow, nerves, the pelvic floor or psychology. Desire (the mental wanting) is distinct from arousal (erection or lubrication). Huberman notes that estrogen supports libido in both sexes: men who crush their estrogen with drugs like anastrozole often lose their libido.

4. Erectile problems in young men often come from the pelvic floor
Malik sees many young men with erectile issues, and they very often have pelvic floor dysfunction linked to stress and long hours of sitting, which surged during COVID. An hour of exercise doesn't offset a day of sitting, so she recommends walking more and using a standing desk.

5. Pornography use is mostly a problem when it displaces real life
The research describes 'problematic pornography use' rather than addiction, and it applies to about 4% of people in studies. Malik says porn use with healthy relationships and functioning is generally fine, and shame is itself harmful. The risk is escalating to more novel material to get the same dopamine response, and avoiding real-world intimacy. Huberman separates watching, masturbating, and masturbating to ejaculation.

6. Daily low-dose tadalafil has broader uses
Beyond the higher doses taken as needed, a daily 2.5–5 mg dose of tadalafil (Cialis) improves erectile function and is used for urinary symptoms from an enlarged prostate. Malik also uses it off-label for pelvic pain and possibly to prevent age-related fibrosis of erectile tissue, which she says isn't standard practice. L-citrulline raises nitric oxide by converting to arginine and lasts longer than arginine itself, but supplements are unregulated. Huberman warns it can trigger severe cold sores in some people.

7. UTIs are common and largely preventable
Up to 50% of women have at least one UTI. Up to a third of those have recurrent infections, meaning two or more in six months or three or more in a year. UTIs are uncommon in men because the urethra is longer, so a man's UTI should be investigated. Prevention starts with 2–3 liters of fluid, ideally water, a day.

8. SSRIs often blunt sexual function
Serotonin inhibits orgasm, which is why SSRIs are used off-label for premature ejaculation. The effect depends on dose. Options include lowering the dose if someone is doing well, switching to an antidepressant like Wellbutrin with fewer sexual side effects, or adding Cialis or Viagra.

EXAMPLES

1. Cranberry works only in the right form
Cranberry is in the American Urological Association guidelines for preventing recurrent UTIs in women. The active ingredient is proanthocyanidins (PACs), at 36 mg in a soluble form. Many supplements reach 36 mg by using the whole berry, including skin and stem, which doesn't work. Juice doesn't either. D-mannose, about 2 g a day dissolved in a drink, helped in a small randomized trial.

2. Vaginal estrogen for recurrent UTIs after menopause
Low estrogen raises vaginal pH because less glycogen is available to feed protective lactobacilli. Estrogen applied in the vagina as a cream, suppository or ring restores acidity and is highly effective against recurrent UTIs. Her clinic checks vaginal pH around perimenopause.

3. Bike seats and genital numbness
In studies of high-volume cyclers, up to 50% reported genital numbness, along with erectile dysfunction in men and reduced lubrication and arousal in women, because the seat's nose presses on the pudendal artery and nerve. Leaning forward and narrow seats make it worse. Malik advises a wider or noseless seat that supports the sit bones (ischial tuberosities), plus good posture.

4. Preventing kidney stones
Doctors use a 24-hour urine test to tailor prevention. General advice: 2–3 liters of fluid a day, less oxalate (don't eat spinach every day; rhubarb and nuts are also high), more citrate from fruits and vegetables (Crystal Light is a convenient citrate source), and less purine-rich meat.

OTHER RELEVANT

1. Don't douche

Douching and scented 'cleansing' products disrupt the vaginal microbiome and pH, raising the risk of bacterial vaginosis and UTIs. Normal discharge and a personal scent are healthy. A new strong or fishy odor is worth getting checked.

2. Fix the underlying health first

Sexual dysfunction often travels with high blood pressure and diabetes. Malik points to the Mediterranean diet as the best-studied diet in this area, plus aerobic exercise and resistance training of large muscle groups, before turning to supplements like tongkat ali, maca or shilajit.

3. Choose the right lubricant

Water-based lubricants are the most accessible, silicone-based ones last longer, and oil-based ones break down latex condoms. For anal sex, which requires lubricant, use products designed for anal tissue.

4. The Coolidge effect applies to both sexes

Huberman notes that a new partner can override the refractory period after orgasm in men, and that women also have a post-orgasmic refractory period that novelty can shorten. Malik ties this to the way novelty drives dopamine, which is also why some porn users escalate.

Ketamine: Benefits and Risks for Depression, PTSD & Neuroplasticity | Huberman Lab Podcast

Date: 2023-07-07 · Duration: 1:42:40
URL: https://www.youtube.com/watch?v=Rxmv7rT9leo

KEYPOINTS

1. Ketamine is a close cousin of PCP with real clinical value and real abuse potential
Both are dissociative anesthetics that block the NMDA receptor. Huberman says ketamine has proven 'miraculous' for some people, though not all, when used clinically for depression, suicidality and PTSD. It also has high abuse potential, and he notes that wider legal access, including take-home prescriptions, has brought more recreational use and some addiction.

2. Standard antidepressants leave a large gap
Drugs built on the monoamine hypothesis, such as SSRIs and bupropion, give true relief to only about 40% of depressed people. Benefits often take weeks or months to appear, and side effects (appetite and sleep changes, sharply reduced libido) make them intolerable for some. Huberman stresses these drugs have still helped many people and prevented suicides.

3. Ketamine works within hours, but the effect is short-lived
Relief can come the same day, even in people unresponsive to SSRIs, and can reduce suicidality, helplessness and worthlessness. Clinical studies also support uses in bipolar depression, PTSD, OCD, anxiety and substance addiction. The antidepressant effect often fades after about three days to a week, and weekly dissociative sessions aren't practical for many people.

4. It boosts plasticity by disinhibition
Ketamine blocks NMDA receptors on inhibitory neurons, which releases the brakes on excitatory neurons in mood and reward circuits. These neurons then fire in bursts, the pattern that best induces lasting changes. Bursting triggers BDNF release; BDNF binds TrkB receptors, adds glutamate (AMPA) receptors and grows new branches on neurons. Pre-clinical and clinical evidence suggests BDNF may actually be required for ketamine's antidepressant effect.

5. The opioid system appears necessary for the antidepressant effect
Ketamine binds mu and kappa opioid receptors, and its metabolite hydroxynorketamine (HNK) is highly selective for them. In a study by Stanford's Nolan Williams, Alan Schatzberg and colleagues, blocking opioid receptors with naltrexone left ketamine's euphoria and dissociation intact but abolished its antidepressant and anti-suicidal effects. Several studies support this.

6. The 'trip' and the therapeutic benefit may be separate
From the naltrexone result, Huberman draws a broader point for ketamine, psilocybin and MDMA. The acute subjective experience may not be what produces long-term relief. He doubts it's strictly either/or, but cautions against assuming the intensity of the experience predicts the benefit.

7. Ketamine quiets the brain's 'disappointment' circuit
The habenula inhibits the dopamine reward pathway (VTA and nucleus accumbens), reducing dopamine and raising cortisol; bright light in the middle of the night activates it. Ketamine therapy appears to lessen the habenula's inhibitory output, making the reward pathway more available.

8. Behavior determines whether the window of plasticity helps
Circuit changes do little unless daily life reinforces them. If someone keeps up pro-depressive patterns, ketamine provides little relief. Seeking stimulating work, social engagement and good physical and mental self-care are the 'anti-depressive behaviors' that make the opened window count.

EXAMPLES

1. The seven-patient trial that started it
In a small early study, seven people with major depression received IV ketamine at 0.5 mg/kg. Effects began within 10–15 minutes, peaked as a euphoric, dreamy, semi-dissociative state at 45–60 minutes, and the euphoria was over in about two hours. Depression relief came within minutes to hours and lasted at least three days, well beyond the drug's acute effects. This made ketamine especially attractive for depression that hadn't responded to other treatments.

2. Twice weekly for three weeks
Later clinical studies gave ketamine twice a week for three weeks. Patients had relief throughout, and many kept some benefit for months afterward before needing to repeat the course. Huberman attributes this durability to genuine circuit rewiring.

3. How dose translates by route
Oral ketamine delivers only about 25% active drug to the bloodstream, and sublingual or troche about 35%. Huberman uses himself as an example: at 100 kg, a 0.5 mg/kg clinical injection would be 50 mg. Matching it would take about 150 mg as a pill or about 200 mg as a troche. Doses of 1–2 mg/kg are in the anesthetic range.

4. What a 'K-hole' is
A K-hole is a pseudo-anesthetized state that happens when someone, usually recreationally, crosses from a sub-anesthetic into an anesthetic dose. Sensitivity varies a lot even at the same body weight, depending on metabolism. Very high doses carry risk of seizure and death, which is why clinical dosing is supervised.

5. R, S or racemic ketamine
After consulting clinicians, Huberman reports that trials so far suggest the combined R/S form is most potent for depression.

S-ketamine, the most commonly prescribed form including as a nasal spray, comes second, and R-ketamine is least effective. He acknowledges individual reports may differ.

6. Learned helplessness models

Much early antidepressant research measured how long a rat or mouse kept swimming before 'giving up' in water, a quantifiable stand-in for learned helplessness. Researchers then tested which drugs lengthened or shortened that time. Huberman notes the limits: you can't ask an animal whether it's depressed, so behavior is the only readout.

OTHER RELEVANT

1. Know where your dose sits

Clinical antidepressant studies use about 0.5 mg/kg by IV or intramuscular injection. Because oral and sublingual routes are less bioavailable, take-home doses are higher in milligrams, and confusion about conversions is a real risk. Ketamine can raise liver enzymes, which is why some frequent users choose routes that bypass the liver.

2. Microdosing has no published support for depression

According to Huberman and his clinician colleagues, there is no published clinical evidence that microdosing ketamine treats depression. The positive data come from 0.5 mg/kg doses or their oral or sublingual equivalents.

3. Use it inside a clinical structure

Most evidence comes from supervised settings. Ketamine can be habit-forming, and repeated home use outside a clinic is a different situation from the trials, so work with a clinician on frequency and setting.

4. Pair treatment with anti-depressive behaviors

In the days after a dose, deliberately engage with rewarding work, people and healthy routines, since these are the inputs the more plastic circuits are built to respond to. Avoid bright light in the middle of the night, which activates the habenula.

Harnessing Passion, Drive & Persistence for Lifelong Success | Tony Hawk

Guest: Tony Hawk
Date: 2023-07-31 · Duration: 2:15:19
URL: https://www.youtube.com/watch?v=VOfwbcveP84

KEYPOINTS

1. Love of the activity came first; there was no career to aspire to
Hawk found skateboarding around age 10 and quit Little League mid-season once he saw skaters 'flying on magic carpets' at Oasis skatepark in San Diego. He turned pro at 14, when first place paid about $150, and after a year and a half had $600 saved, which he spent on a moped. Huberman uses this to argue that excellence almost always rests on loving the thing itself, not on a goal of fame or money.

2. Drive and discipline outweigh natural talent
Hawk says he was 'gangly' and slamming constantly as a beginner, nobody's idea of a natural. He has watched naturally gifted skaters fail to use their gifts, and driven, sloppy-looking skaters like Andrew Reynolds, who tried every trick, become 'the boss'. He gives drive as much weight as talent, 'if not more'. Huberman adds that in science too, the people who keep showing up when others leave tend to win out.

3. New tricks come from combining pieces he has already mastered
Hawk does not 'throw caution to the wind'. He breaks a trick into parts he has done in other forms, such as the entry, the grind and the landing, then works on timing until they fit. At today's technical level, though, a make can come from a tiny unconscious adjustment, so some tricks, like his 360 shove-it to 5-0 fakie, he has landed only once and cannot reliably repeat.

4. Ideas arrive in the drowsy state before sleep and in mundane moments
Hawk sometimes wakes at night to write down a trick idea. He came up with the half-cab body varial to backside blunt for the X Games in Japan while falling asleep, made it twice alone on his ramp after weeks of preparation, and landed it on his last run. Huberman highlights this liminal state between wakefulness and sleep as fertile ground for ideas, and Hawk adds that showers and walks work too.

5. Dreams can track recovery, and REM paralysis explains 'can't move' dreams
Before his injury Hawk often dreamed he could not skate, as if the ramp were carpet. During recovery his dreams shifted to being able to do all his tricks again. Huberman explains that in REM sleep the brain is highly active while the body is paralyzed and cannot release adrenaline, which may be why people feel they want to move but cannot.

6. A late growth spurt changed his skating
Hawk was so small that at 16 police assumed he was 13, and he wore elbow pads as knee pads, inspired by a photo of Steve Caballero. He shot up around 17, gaining height and strength and suddenly going about eight feet out rather than four, while bowls 'looked smaller'. Huberman notes that a longer arc of puberty and late growth correlate with a longer life.

7. Ignoring medical advice turned a femur break into a non-union fracture
Hawk broke his femur on a low-speed 540, a trick he had done for nearly 40 years, and initially rushed back. Stepping off his board on a mini ramp, he felt the bone shift, then spent seven to eight months in denial, compensating by putting about 75% of his weight on his back foot. X-rays finally showed the bone had never joined and kept separating. A non-union specialist reoperated and ordered two months of no movement, and Hawk followed it.

8. Avoiding the party culture was a performance decision
Early skating culture defined itself against team sports, with drinking, smoking and fast food. Hawk stayed out of it because he watched peers 'party their skills away'. Training then meant Stacy Peralta buying spaghetti the night before a 1983 contest; today pros have trainers and sponsors pay for support. Hawk credits a doctor of physical therapy for getting him back after the injury.

9. Hard lessons, not early fame, made him financially prudent
His father co-signed on property at 17, but by 1991–92 the four-acre ramp property was draining him during skating's slowest years. He took equity out to start Birdhouse in 1992, sold the house, and lived on Taco Bell and Top Ramen while taking any demo or stunt-double job. He traces his shrewdness and punctuality to that period.

EXAMPLES

1. Turning down a $500,000 buyout on the video game
Pitches for a skate game were rejected; at Midway he was asked why anyone would buy a skateboarding video game. Activision later showed him a prototype built on the engine of a Bruce Willis game. He spent about 18 months testing builds, and around 1998, before release, he declined a half-million-dollar buyout of royalties. He calls letting it ride the best financial decision he ever made; the series ran to about 10 games.

2. Landing the 540 again with his wife as the only spectator
To get the trick back after surgery, Hawk stopped drinking, adjusted his diet, and spent sessions just finding the spin and landing zone. He had a heart-to-heart with his wife, who did not want to live through another injury. He did the trick head-high on purpose, because on his 14-foot ramp more air means more time to adjust.

3. The first backside varial
Alone at Oasis, Hawk landed the first backside varial below the coping. He says the feeling of creating something new is 'the buzz I've been chasing ever since'. Huberman calls it a chemical fingerprint of progress.

4. Frank Hawk's contest organizing
His father ran contests unpaid for kids who were 'kind of lost'. That included taking in a stranded 14-year-old Huberman

around 1989; Huberman says the family's warmth showed him what a healthy family looked like.

5. Equal events changed women's skating

Hawk credits pioneers like Cara-Beth Burnside, Patti Hoffman and Elissa Steamer. The road to the Olympics required equal divisions, and Vans Park Series offered equal prize money. He names Lyn-Z Adams (Hawkins Pastrana) as the first woman to land a 540 on vert.

OTHER RELEVANT

1. Be the expert on yourself while still obeying experts

Huberman's read of Hawk's recovery is to follow specialists on the non-negotiables, like two months of immobilization, while setting your own expectations for how fast you can return, rather than anchoring to average timelines.

2. Use a warm-up run as a daily diagnostic

Hawk admits he never stretched or meditated, but he always does a routine run of basic tricks to judge stiffness and decide what to adjust that day. Huberman compares this to a surgeon's checklist.

3. Make risk safer by choosing your environment

At 55 and taller and slower than before, Hawk avoids eight-foot pools with no landing zone and skates his big vert ramp, his 'happy place'. Going bigger can be the safer option when it buys time and space.

4. Give kids their own scene

His son Riley felt the pressure of his father's shadow, drifted away, then found his own crew in high school and turned pro. Hawk now acts as chauffeur and filmer for his kids, and his Skatepark Project has helped fund nearly 1,000 public skateparks in underserved areas.

AMA #9: Kratom Risks, Does Infrared Sauna Work & Journaling Benefits

Date: 2023-07-28 · Duration: 0:26:32
URL: https://www.youtube.com/watch?v=HoH93judXmE

KEYPOINTS

1. The free portion of this AMA is entirely about kratom
Huberman devotes the publicly released first 20 minutes to one question: what are the short- and long-term effects of kratom? The infrared-sauna and journaling questions in the title are answered in the subscriber-only remainder, so these notes cover kratom only.

2. Kratom is a plant-derived opioid sold over the counter
Kratom comes from the Mitragyna speciosa tree, native to Indonesia. For at least a couple of hundred years, people have chewed its leaves for a mild stimulant effect. Today, concentrated extracts are sold as supplements, mostly in capsules and sometimes as raw powder, without a prescription in the US. Low doses feel mildly stimulating and euphoric. Higher doses act as a painkiller and sedative, which is the classic opioid profile.

3. It acts mainly on the mu-opioid receptor, like morphine
Huberman rejects the claim that kratom is fundamentally different because it hits kappa receptors while morphine and hydrocodone hit mu receptors. Kratom binds preferentially to the mu-opioid receptor, and somewhat to kappa, in places including the brainstem and the periaqueductal gray, which produces pain relief and mild euphoria. The proof: pretreating people with a mu-receptor blocker eliminates all of kratom's effects, even the mild low-dose stimulation. 'You likely like kratom because it's an opioid.'

4. It does engage reward circuitry, despite claims otherwise
Proponents say kratom doesn't trigger dopamine and so can't be addictive. Huberman says that's untrue. Mu-receptor activation indirectly recruits reinforcement circuits involving both dopamine and serotonin, the same route by which other opioids become habit-forming.

5. Kratom is habit-forming and addictive at euphoric doses
Above the low, mildly stimulating range, users clearly develop tolerance, escalating doses and withdrawal. Huberman defines addiction as continuing despite negative consequences, and more broadly as 'the progressive narrowing of the things that give you pleasure.' When he asked about kratom on social media, one camp described severe addiction, including people who needed rehab and developed other addictions.

6. Some people use it to taper off stronger opioids, with conditions
The other vocal camp credits kratom with getting them off morphine, oxycodone or hydrocodone. Physicians Huberman respects reconciled the two views. Avoid kratom if you can, but if the choice is between addiction to potent opioids and using kratom to taper off them, kratom is preferable only if the person commits to lowering the dose and eventually stopping. Anyone dependent on opioids should plan this with their physician.

7. Doses aren't comparable across products
You'll hear that 1–5 or 1–6 g per day keeps people out of the addictive range, but those grams refer to whole kratom, not its individual alkaloids. Brands differ widely in alkaloid ratios, and the alkaloids differ in how strongly they hit the opioid system, so 1 g of one product isn't equal to 1 g of another. Some users deliberately seek high-alkaloid products that hit the mu receptor hardest.

8. Individual response varies enormously
Huberman cites estimates that somewhere between 10% and 40% of people respond to opioids especially strongly and 'really like them,' though the studies are incomplete. He is the opposite. Post-surgery Vicodin makes him nauseous, and he would rather endure pain. He compares this to the 8–10% of drinkers who get an unusually large dopamine response to alcohol and face high risk of alcohol use disorder. Strong responders should never start kratom.

9. Death is rare but respiratory suppression is the danger
Kratom's potency is roughly one-sixth that of hydrocodone, and it isn't known to suppress breathing at low to moderate doses. Combined with other opioids or alcohol, or at escalating doses, it can. Huberman draws on Jack Feldman's research showing that opioids bind brainstem sites that generate the spontaneous physiological sighs that reinflate the lungs during sleep. Suppressing those sighs is a major way opioid deaths happen. The scant data suggest kratom-related deaths share this mechanism, often alongside other substances.

EXAMPLES

1. Robert Malenka's rule
Huberman repeats the point made by Stanford addiction researcher Dr. Robert Malenka: 'It is impossible to get addicted to a substance that you've never consumed.' This is the basis for his advice that anyone who hasn't tried kratom shouldn't.

2. The 'I'm not addicted' test
Huberman describes heavy users who deny dependence but become anxious at the idea of going a week without kratom. He sees the same pattern in cannabis users who refuse a 10-day break, and says this reluctance and the withdrawal that follows are telling.

3. Why 'less bad than X' is a weak argument
Huberman rejects the logic that because kratom is gentler than morphine, or cannabis gentler than alcohol, it's therefore good. He asks that each substance be judged on its own benefits and risks. He is balanced on cannabis, for example, but warns young males predisposed to psychosis away from high-THC products.

4. Runner's high as the body's own opioid

Long, repetitive effort releases endogenous opioids that bring pain relief, mild euphoria and a 'sheen' on the world. Morphine and kratom mimic this system at much higher potency, with more sedation and dreaminess.

OTHER RELEVANT

1. If you've never taken kratom, don't start

Huberman's bottom line is to avoid it entirely, especially if opioids have ever felt unusually good to you.

2. If you already use it, watch dose creep and product type

Notice steadily rising intake, switching to higher-alkaloid products, or resistance to a short break. Never combine kratom with alcohol or other opioids, because of the respiratory risk.

3. Treat it as a supplement category apart

Huberman's general order is behaviors, then nutrition, then supplements only if needed. Opioid-acting supplements make him 'nervous' because of their abuse and addiction potential and lack of regulation.

How to Shape Your Identity & Goals | Dr. Maya Shankar

Guest: Dr. Maya Shankar
Date: 2023-07-24 · Duration: 2:33:56
URL: https://www.youtube.com/watch?v=X8Hw8zeCDTA

KEYPOINTS

1. Anchor your identity to why you do things, not what you do
Shankar, a cognitive scientist and host of A Slight Change of Plans, introduced herself as a violinist first and Maya second until a torn hand tendon ended her career hopes as a teenager. Defining herself by the 'what' left her with nothing when it disappeared. Stripping the violin down to its core, she found that what she loved was emotional connection, which runs through her academic work, her White House role and her podcast.

2. Identity foreclosure and identity paralysis
Identity foreclosure is when parents, peers and culture impose a path on you early, narrowing what you think you can do; asking children 'what' rather than 'who' they want to be reinforces it. Identity paralysis is the stuck, disoriented state that follows when an identity is suddenly lost, where you cannot even imagine a future. Her remedy is to find your 'throughline': the underlying features of what you loved, and new places to express them.

3. We hate uncertainty more than bad outcomes
Shankar cites studies where people were more stressed by a 50% chance of an electric shock than by a 100% certain one. Change brings uncertainty, so people cling to a suboptimal status quo. Reducing your 'need for cognitive closure', the drive for clear, definitive answers, and becoming more open to mystery and awe is linked in research to greater well-being and resilience through change.

4. The end-of-history illusion distorts how we predict change
Dan Gilbert's work shows people readily admit they changed a lot over the past decade but assume who they are now is who they will stay. So we imagine our present selves facing a future diagnosis or move, forgetting that change will change us. Shankar recommends auditing yourself during a big change, because effects spill into every area of life.

5. Awe requires vastness and a need to update your model of the world
Drawing on Dacher Keltner at UC Berkeley, awe needs perceived vastness, physical or conceptual (Times Square, or a book about the mind), plus a 'need for accommodation': fitting new information into your existing model of the world. That updating is what opens the mind. Awe can also be negative.

6. Framing goals as approach rather than avoidance is usually more motivating
'Eat healthier foods' is an approach goal; 'avoid junk food' is an avoidance goal. Succeeding at an approach goal brings pride and boosts motivation and perseverance, while succeeding at an avoidance goal brings mere relief. Approach goals are also easier to measure, since you can count salads but not cookies resisted. Some people, Shankar notes, are genuinely more driven by fear.

7. Owning the goal fuels motivation
Citing Ayelet Fishbach (University of Chicago) and research showing people prefer their own judgment over a better-performing algorithm that excludes them, Shankar says goals set by others undercut agency. With a coach or boss, ask for a set of options and choose your own targets, for example whether today is heavy deadlifts or squats.

8. Motivation sags in the middle of a goal
Motivation peaks at the start and rises again near the finish (the goal-gradient effect), with a lull in between. Because you cannot eliminate middles, shorten them by setting weekly rather than annual goals.

9. The peak–end rule shapes whether you come back
Per Daniel Kahneman and Amos Tversky, we remember experiences mostly by their most intense moment and their ending. In cold-water and colonoscopy studies, adding a few slightly less unpleasant minutes made people rate the whole experience better, and colonoscopy patients were more likely to return for follow-ups. Applied to a brutal workout, end with a few slightly easier minutes. If you love intensity, finishing hard may work better for you.

EXAMPLES

1. Walking into Juilliard unannounced
Passing the building, her mother suggested they go in. Within an hour Shankar was auditioning for a top teacher, who said she wasn't ready but invited her to a five-week summer boot camp in Colorado. She was admitted that fall. Later she cold-emailed the White House to propose a behavioral science adviser role, and was hired into it.

2. 'Earned' versus 'eligible'
With one email and almost no budget, her team told veterans they had 'earned' an employment and education benefit rather than being 'eligible' for it. That single word raised uptake by 9%, which she attributes to the endowment effect: we value what we own or have earned.

3. Temptation bundling
From Katie Milkman (Wharton): pair a chore with something you enjoy, such as podcasts during laundry. The key is to forbid the treat elsewhere; Shankar saves a favorite album for lifting weights only, so it keeps its pull.

4. Distancing to find blind spots
Ethan Kross's research suggests thinking about a problem in the third person, as if advising a friend, adds objectivity and dampens activity linked to hostility. When venting, ask the friend to act as a 'cognitive adviser' who pokes holes in your story rather than just soothing you.

5. Learning by ear first

Shankar's first teacher, a concertmaster who had never taught before, let her mimic and play pieces rather than drill scales. Her technique suffered later, but she believes skipping straight to the fun parts helped her fall in love with the instrument.

OTHER RELEVANT

1. Set goals in the state you'll pursue them

Hot–cold empathy gaps mean that Sunday-afternoon you over-promises for 6 a.m. you. Set gym goals at the gym.

2. Build in slack and use fresh starts

Give yourself an 'emergency reserve', say three skip days a month, so a slip doesn't end the goal. Launch new habits at milestones like a move, a new job, the new year or even a Monday, when old cues are disrupted.

3. Let the positive feedback count too

Huberman admits scanning comments only for negatives. Shankar's advice is to stay open to criticism without making being right the source of your pride.

How to Enhance Performance & Learning by Applying a Growth Mindset

Date: 2023-07-17 · Duration: 1:41:24
URL: https://www.youtube.com/watch?v=aQDOU3hPci0

KEYPOINTS

1. Praising intelligence can backfire
Huberman starts with Claudia Mueller and Carol Dweck's late-1990s paper, 'Praise for intelligence can undermine children's motivation and performance'. More than 100 children received intelligence feedback ('you're so smart, so talented'), effort feedback ('you tried really hard, you kept going after a wrong answer') or no specific praise. The intelligence-praised children later chose easier problems so they could keep earning the label, while the effort-praised children picked harder problems that would teach them more.

2. The performance effect runs in both directions
All the children started at similar levels. On a second problem set, the control group scored about the same as before, say 75% if they had scored 75% the first time. The intelligence-praise group's scores dropped significantly, and the effort-praise group's rose significantly. Effort-praised children also took on more problems overall.

3. Identity praise also invites dishonesty
When asked to report their scores to other children, publicly or even privately on paper, those given intelligence praise were more likely to inflate them, even when they were already in the top bracket. Huberman calls this an underappreciated cost of telling people they are gifted.

4. Timing doesn't rescue identity praise
Telling someone 'you're so smart, you'll ace this' before an exam, or 'you're so talented' after a perfect score, both undermine later performance. Effort praise helps whether it comes before or after. It must be genuine, though: praising effort that didn't happen fails because people know when they are being lied to.

5. Effort and attention are what you can truly control
Huberman finds 'control what you can control' irritatingly vague and makes it concrete: the two things inherent to you and your nervous system are where you place your attention and how much effort and persistence you apply. Unlike labels, effort verbs transfer across domains. A good memory doesn't make you a good musician, but a habit of practising and analysing errors goes wherever you do.

6. Growth and fixed mindsets show up in how the brain handles errors
In an EEG (event-related potential) study by Mangels and colleagues, with Dweck as senior author, people answered trivia questions, rated their confidence and were then told whether they were right. When told they were wrong, people with a fixed view of intelligence showed a larger error-related P3 signal over the anterior (rostral) cingulate, linked to emotional and bodily responses. Growth-mindset participants' activity shifted toward regions associated with cognitive appraisal: they turned attention to understanding the mistake.

7. You can switch modes in the moments after a mistake
Everyone has a fixed mindset in some area, especially when embarrassed about being confidently wrong. Huberman's point is that you don't have to suppress the feeling. You can add attention to the error, asking what led to it and digging in, which gradually outweighs the emotional hijack. If emotions are too high, it's fine to wait a day or two before analysing.

8. How you view stress changes how your body responds
Alia Crum's paper 'Rethinking stress: The role of mindsets in determining the stress response' gave people one of two short, true lectures: that stress is harmful or that stress improves health and vitality. Huberman stresses that this isn't placebo or deception. Those taught that stress can enhance performance showed shorter cortisol release, better cardiac stroke volume and more peripheral blood flow, and could see more anabolic hormonal effects. Chronic, sleep-disrupting stress remains harmful.

9. Growth mindset plus stress-is-enhancing mindset work synergistically
David Yeager (UT Austin, a former Dweck student) and colleagues published 'A synergistic mindsets intervention protects adolescents from stress' in Nature in July 2022. Across six experiments with imagined, laboratory and real classroom stress, students who learned both mindsets showed better peripheral blood flow, altered cortisol responses and more challenge-oriented thinking. Notably, a single 30-minute session worked, compared with earlier programmes of four to eight sessions.

EXAMPLES

1. What effort praise sounds like
Instead of 'you're a great athlete', try 'I loved that after you missed the shot you sprinted back on defence'. Instead of 'you're brilliant', try 'you went back to the problem sets and talked with classmates until you understood what went wrong'. Huberman says this matters most after a success, when labels are most tempting.

2. The Trier Social Stress Test
In one experiment in Yeager's paper, students prepared and delivered a speech to evaluators who frowned and crossed their arms, then did mental arithmetic, while researchers measured heart rate, blood pressure and salivary cortisol. Students given the mindset training responded more like people facing a challenge than a threat.

3. The letter to a future learner
When no growth-minded teacher or mentor is available, write a letter on an index card or a sheet of paper to the next person trying to learn your skill. Explain growth versus fixed mindset and how stress can enhance performance. This self-teaching exercise, used in one of Yeager's studies, improved the writers' own performance.

4. Seek help on both errors and wins

People who keep improving tend to ask others why they fell short and also why they did well, because outside observers often see contributing behaviours you miss.

OTHER RELEVANT

1. Teachers and students together

The best results come when both adopt these mindsets; teachers then see students as less fixed, and students see themselves that way too.

2. Why 'the mind is like a muscle' misleads

Lifting gives you a pump, a preview of future growth. Learning gives the opposite: frustration, poor performance and sometimes a headache while you're learning. Huberman suggests imagining a muscle that shrinks during training and then rebounds larger, with sleep as the recovery that consolidates the gains.

3. Self-examination prompt

List what you are good and bad at, why, and how much of your identity rests on those labels; it shows where you have attached yourself to outcomes instead of process.

How Your Brain’s Reward Circuits Drive Your Choices | Dr. Robert Malenka

Guest: Dr. Robert Malenka
Date: 2023-07-10 · Duration: 2:50:03
URL: https://www.youtube.com/watch?v=RI112zW8GDw

KEYPOINTS

1. The reward circuit evolved to tag what matters for survival
Malenka, a Stanford psychiatrist and neuroscientist, describes dopamine neurons in the ventral tegmental area (VTA) projecting to the nucleus accumbens. This system marks food, water, sex and social contact as worth pursuing again. Drugs of abuse 'trick' it into treating an experience as vital for survival, which is why they can generate such compulsive repetition.

2. Route of administration drives addictive liability
You can't become addicted to something you never take, and how you take it matters. Smoking or injecting cocaine or methamphetamine gets the drug into the brain almost instantly and produces a rapid, powerful dopamine surge in the accumbens lasting seconds to minutes. Malenka links this to the crack epidemic and today's meth crisis. He notes our brains didn't evolve to handle drugs that potent, or synthetic opioids like fentanyl.

3. Drugs remodel reward synapses using normal learning machinery
Work from Malenka's lab and others shows cocaine, methamphetamine, morphine and heroin cause powerful plasticity at synapses onto dopamine neurons and accumbens neurons. The changes resemble those used in adaptive learning and memory. The circuit is highly plastic and can become sensitized to particular experiences.

4. Who becomes addicted is a mix of genes and environment
Many people use a substance without developing a problem. Malenka attributes the difference to genetics, current environment and the environment you grew up in, all of which shape the reward circuitry. Availability of a substance in a society also strongly shapes which addictions become widespread.

5. Reinforcing is not the same as rewarding; wanting is not liking
Something is reinforcing if it makes you repeat the behavior, and rewarding if it actually feels good. Kent Berridge and Terry Robinson's 'wanting versus liking' distinction explains a friend's description of cocaine: 'I hate it, but I want to do it again.' The same pattern shows up in destructive relationships. Huberman suggests 12-step programs may work partly by building a liking for sobriety that outcompetes the wanting.

6. Cues tied to powerful experiences can trigger cravings for decades
Because reward circuitry is closely linked to memory, places and contexts become reinforcing in their own right. Malenka tells of smoking for a few weeks in Paris at around 20, then not smoking after returning home. Forty years later, he still craves a cigarette every time he goes back to Paris.

7. Oxytocin and serotonin make social interaction reinforcing
Building on decades of prairie vole work by Larry Young and Tom Insel showing that oxytocin in the accumbens supports pair bonding, Malenka's lab found oxytocin there promotes sociability in mice by triggering serotonin release. Oxytocin also modulates dopamine neurons in the VTA. Malenka acknowledges a recent paper questioned oxytocin's role in pair bonding, and urges weighing it against 30 years of contrary evidence and its own methodological limits.

8. MDMA's pro-social and addictive effects may use different systems
MDMA reverses the serotonin and dopamine transporters, the 'vacuum cleaners' that normally clear these molecules, so they pump the molecules out. It favors serotonin roughly 70/30 or 80/20. Malenka's hypothesis, supported so far in mouse empathy models, is that its addictive liability runs mostly through dopamine while its pro-social and empathogenic effects run through serotonin, notably the 5-HT1B receptor in the accumbens.

9. Gambling is uniquely tied to hope
Casinos employ people to tune slot-machine payout schedules for maximum return visits. Huberman relays a gambling addict's insight: unlike an alcoholic or cocaine user, a gambler believes the next bet could change everything for the better.

EXAMPLES

1. Bystander mice catch pain
In work published in Science with Monique Smith (now at UC San Diego), an uninjured 'bystander' mouse that spent one hour with a mouse in modest hind-paw pain then showed pain behaviors itself for roughly 4–20 hours. Smell is likely part of the signal: bedding from mice in pain had a similar effect. Malenka calls these assays behavioral antecedents of empathy.

2. Social transfer of pain relief
When two mice were in pain and one received morphine, the untreated mouse that spent time with the now pain-free one also showed analgesia. Malenka relates this to the human idea of social buffering of pain: his own neck pain bothers him less when he's socially engaged.

3. R- versus S-MDMA
MDMA comes in two mirror-image forms. Other labs' work suggests S-MDMA interacts more with dopamine and R-MDMA more with serotonin. MindMed, on whose scientific advisory board Malenka sits (he disclosed this), is preparing a trial of one form for sociability deficits. MAPS, founded by Rick Doblin, has run small MDMA studies in high-functioning people with social anxiety.

4. Huberman's own MDMA trial participation
Huberman says he participated in an MDMA trial and found it very pleasant. He stresses it isn't for everyone and remains a Schedule I drug, so possessing or selling it can lead to prison.

OTHER RELEVANT

1. Respect how fast-acting a drug or behavior is

The faster and bigger the dopamine hit, as with smoking, injecting or highly engineered products like cigarettes and slot machines, the higher the addictive liability. Abstaining from first exposure is the one guaranteed protection.

2. Expect cue-triggered cravings and plan for them

Places, people and routines linked to past use can provoke cravings years later. Anticipating these triggers, rather than being surprised by them, is part of staying abstinent.

3. Build rewards around the alternative

Because wanting and liking can be pulled apart, recovery approaches that make sobriety or the new behavior genuinely enjoyable may weaken the pull of the old one.

4. Treat psychedelic and MDMA therapy with cautious optimism

Malenka is excited by these drugs as powerful probes and potential therapies acting on specific receptors: 16 serotonin receptor types, 2A for psilocybin and LSD, 1B for MDMA's social effects. He urges appropriate caution, rigorous trials and respect for current legal status.

5. On autism language

Malenka argues for respecting adults who don't want to be labeled as having a brain disorder, while recognizing that many children, some severely impaired, need help and research. His suggestion is to ask people what they prefer.

How to Improve Your Eye Health & Offset Vision Loss | Dr. Jeffrey Goldberg

Guest: Dr. Jeffrey Goldberg
Date: 2023-06-26 · Duration: 3:08:44
URL: https://www.youtube.com/watch?v=_ltcLEM-5HU

KEYPOINTS

1. Eye checks in childhood screen for a few key problems
Goldberg, a Stanford ophthalmologist, explains that newborns get a 'red reflex' check in the nursery and then at well-child visits. In elementary school, screening looks for amblyopia, where one eye stops communicating properly with the brain. It can come from very different prescriptions in the two eyes or from strabismus (misaligned eyes). A child saying 'I can't see the board' is another common reason for an exam.

2. Outdoor time, not just less close-up work, seems to slow nearsightedness
Myopia is described as an epidemic in China and is common at Stanford. Older cohort studies blamed near work, but newer research points to time spent in indoor light versus outdoor full-spectrum light. Early randomized trials found that children assigned to spend time outdoors progressed less over a couple of years. One to two hours a day clearly beats none, but the ideal amount is still unknown.

3. Undercorrecting can help train children's eye muscles
For misalignment in kids and young adults, clinicians often deliberately give less than a full prism correction so the eye muscles keep working to align both eyes. Sometimes they use a mild plus lens in children who over-converge when reading. An optometrist is usually the right first stop.

4. Needing reading glasses around 40 is presbyopia
The lens inside the eye stiffens with age, making it harder to shift focus from distance (3 feet or more) to reading distance (12–14 inches). Most people notice it around 40, give or take five to ten years. Goldberg found an abandoned pair of +1.25 readers at about 40–42 and 'got addicted' because his near vision was suddenly sharp.

5. UV blocking is worthwhile, unlike all-day blue blocking
UV light dries and irritates the eye's surface and, over the long term, speeds up cataract formation, a clouding of the lens caused by oxidation. Very intense UV exposure can damage the retina. Goldberg calls UV filtering 'absolutely standard' and safe in eyeglasses. Huberman adds that blue light isn't inherently bad: get plenty of bright light during the day and avoid bright light of any color late at night.

6. Dry eye worsens with age and screen time
People blink less while reading, using screens or watching TV, so tears spread less and less oil is released. Preservative-free artificial tears can be used as often as needed, even hourly. Clean the eyelids with lid scrubs or diluted baby shampoo to keep the oil glands working, and treat allergies. In severe cases, eye drops made from a patient's own blood serum, rich in growth factors, can help.

7. Glaucoma is the world's leading cause of irreversible blindness
Glaucoma is a degenerative disease of the optic nerve and causes no symptoms until late, when peripheral vision is already lost. Screening checks eye pressure, the appearance of the optic nerve head, imaging and peripheral vision. Lowering pressure helps even in people whose pressure is normal. Treatment starts with eye drops or selective laser trabeculoplasty (SLT), then surgery. Even with treatment, 10–20% of patients lose meaningful vision.

8. What's good for the heart is good for the eyes
Smoking and vaping are 'a no-no' for both macular degeneration and glaucoma. The optic nerve head sits where two blood supplies meet, which makes it vulnerable. Goldberg advises glaucoma patients to eat well, take a multivitamin and exercise.

EXAMPLES

1. Huberman's double vision after swimming
After swimming as a child with one eye shut, Huberman came out seeing double until doctors patched his good eye. Vision recovered in about a day, but his depth perception remains poor. Goldberg guesses he already had intermittent strabismus that the swim tipped over, since an hour with one eye closed rarely causes this on its own.

2. The LiGHT trial
In this large trial, glaucoma patients were randomly assigned to SLT laser or the most common first-line eye drop. Both worked at least as well on many measures, and over the long term the laser had advantages, including not having to remember nightly drops.

3. AREDS and AREDS2 for macular degeneration
The original AREDS trial tested high-dose vitamins C and E, zinc, copper and beta-carotene, and slowed macular degeneration. Beta-carotene showed a slight increase in cancer risk. AREDS2 found lower-dose zinc worked as well, and swapping beta-carotene for lutein and zeaxanthin did even better, cutting progression of moderate-to-severe dry macular degeneration by about 25% over a couple of years. Goldberg calls this a strong 'yes, you should do this', though the benefit for mild disease is less clear.

4. High-dose vitamin B3 for glaucoma
B3 (nicotinamide) feeds the NAD pathway, which helps cells manage energy and oxidative stress. After strong mouse data, two small randomized trials found it very safe and found short-term improvements in visual fields and retinal electrical activity. Three or four larger trials are under way. Goldberg already suggests it to patients who are running out of options, but warns against generic 'glaucoma preservation' supplements.

5. Red light therapy for the retina

Huberman describes two published studies in which a few minutes of red or near-infrared light in the morning, from about 2 feet away a few times a week, offset some age-related vision loss in people over 40. Goldberg calls the data 'very compelling' but says the ideal dose, wavelength and timing are still being worked out. Both warn that light of any color can damage the eye if it's too bright.

OTHER RELEVANT

1. If you have glaucoma, take your drops

Skipping preventive drops is common because they don't make you feel better right away. For severe glaucoma, sleeping propped up at about 30° may help, but not at the cost of good sleep. Studies conflict on whether sleeping on one side matters, and it probably doesn't.

2. Floaters and eyelid twitches are usually harmless

Most floaters fade on their own, and surgery to remove the eye's gel isn't worth the risk just for floaters. Eyelid twitches usually come from a single irritable nerve ending, often worse with fatigue.

3. The retina may become an early warning system for brain disease

The retina is part of the brain, and its degeneration tracks with Alzheimer's and other neurodegenerative diseases. Retinal imaging may become a way to screen for these conditions and track their progression.

AMA #8: Balancing Caffeine, Decision Fatigue & Social Isolation

Date: 2023-06-23 · Duration: 0:25:20
URL: https://www.youtube.com/watch?v=FE0lTEUa7EY

KEYPOINTS

1. The free portion of this AMA covers only the daily-caffeine question
Huberman spends the publicly released first 20 minutes on one listener question: is there a net benefit to drinking caffeine every day, and how do you know if it suits you? The decision-fatigue and social-isolation questions in the title are answered in the subscriber-only remainder, so these notes stick to caffeine.

2. For most adults, daily caffeine is fine with two conditions
For people roughly 18–20 and older, Huberman says daily caffeine 'is not going to be a problem' as long as it doesn't cause anxiety or panic attacks and doesn't disrupt nighttime sleep. He's aware of no drawback to daily intake beyond those, and points out that some evidence suggests caffeine can increase dopamine receptors, which may explain its mood-lifting effect. He calls those human reports 'scattered.'

3. Stop caffeine 8–12 hours before bed, even if you can fall asleep anyway
Because of caffeine's half-life, a 3–4 p.m. coffee followed by a midnight bedtime still degrades sleep architecture, reducing both slow-wave deep sleep and REM sleep. Together, those two stages largely determine how alert and sharp you feel the next day. Huberman admits he sometimes has a late-afternoon coffee and says not to obsess over an occasional one, just don't make it a habit.

4. Caffeine works by blocking adenosine, and the crash is adenosine catching up
Adenosine builds up the longer you're awake and creates sleep pressure. Caffeine occupies adenosine receptors. When it unbinds, the adenosine that accumulated in the meantime floods the vacant receptors, which produces the crash. With an estimated 90% of adults worldwide drinking caffeine daily, Huberman calls it the most popular drug on the planet.

5. Daily users mostly drink caffeine to feel normal, not enhanced
Caffeine does improve learning, memory, energy and stamina in studies. But those studies typically use either caffeine-naive people or habitual users who abstained for 4 days to 2 weeks and were tested in a foggy, low-energy withdrawal state. So caffeine enhances performance relative to the uncaffeinated state. For a habitual user, the usual dose just restores baseline, and only intake above that baseline produces a real boost.

6. Typical doses vary widely by cup and person
Most people tolerate 100–300 mg, depending on body weight and tolerance. Huberman says a 'typical' cup doesn't exist: a 6–8 oz coffee might contain 100 mg (weak) to about 300 mg, and very strong brew or an added espresso shot can push it to 400–500 mg. Some people are so sensitive that even decaf or chocolate makes them jittery, sweaty or gives them palpitations. He says they lose nothing health-wise by avoiding caffeine.

7. Children under about 14 should avoid caffeine where possible
Huberman notes there's little evidence for the claims that caffeine stunts growth or leaches calcium from bones. Still, as a former developmental neurobiologist, he dislikes the idea of a wiring brain being 'bathed in an adenosine receptor antagonist.' Small amounts, as in some chocolate, are probably fine, but energy drinks, soda, coffee and tea are 'a bad idea' for children under 14. For ages 15–18 or 20 the risk is probably lower, but limiting intake is still advantageous.

8. Energy drinks add theanine and L-tyrosine, which makes high caffeine easier to keep drinking
Some energy drinks carry 200–800 mg of caffeine, and many now add L-tyrosine (a dopamine precursor) and theanine. Theanine takes the edge off jitters, which Huberman calls a 'trick' that lets people keep drinking without feeling overstimulated. He suggests leaving these ingredients to adults over 18 and getting caffeine from a 'clean source' like plain coffee or tea, knowing what each ingredient does if taken chronically.

9. A one-day spike above baseline brings a next-day crash, so don't chase it
Whatever your baseline is (0, 200 or 400 mg), doubling it gives a strong lift followed by a lethargic, slightly low day, which Huberman ties to dopamine- and adenosine-receptor changes. The mistake is to keep drinking the higher amount and reset your baseline upward. Instead, get through the crash day with extra sunlight and movement, then return to your usual amount. Expect mild withdrawal lasting about 24–48 hours.

EXAMPLES

1. The listener whose caffeine stopped working
The questioner found that after a few weeks of daily caffeine they had poor sleep, low appetite and anxiety. Without it, their meditation and mindfulness improved, but they felt lethargic and unmotivated. Huberman calls this the classic pattern of overuse (not abuse, which he reserves for things like large doses of caffeine pills) plus withdrawal.

2. Huberman's own habit
He has drunk caffeine since his teens, mostly as brewed, unflavored yerba mate, plus black coffee, espresso or Americanos. He warns to avoid smoked yerba mate, which can be carcinogenic. He usually delays his first caffeine 90–120 minutes after waking to avoid an afternoon crash.

3. The sick-week confound
The last time Huberman went 4–7 days without caffeine was while ill. He wonders whether part of his malaise was withdrawal, since he felt much better on resuming coffee, but concedes the recovery from illness coincided, so 'it's not a good experiment.'

4. How caffeine studies are usually built

Researchers take chronic users, impose 4 days to 2 weeks of abstinence (bringing headaches, fog, malaise, sometimes mild depression), then give caffeine and test cognition or physical output against that low point. Alternatively, they test people who never use caffeine. Both designs show gains, which is why the benefits look bigger than a daily drinker experiences.

OTHER RELEVANT

1. Reset protocol: halve, pause, then live on the half dose

Cut intake by about 50% for 3–4 days (for example, 4 oz of coffee plus 4 oz of decaf instead of 8 oz of coffee), then take 1–2 full days off. Those days will feel far easier than quitting cold turkey. Then resume at the half dose as your new baseline, and use your old full dose only occasionally when you want a real performance boost.

2. Slower alternative: taper 10–15% per day

If you prefer, reduce volume or concentration by about 10–15% per day over 4–7 days. Huberman notes most people lack the patience for this and that eyeballing amounts is fine unless you use pills.

3. Morning timing

Delay your first caffeine to about 90 minutes after waking, or 90–120 minutes if you get afternoon crashes, and keep it 8–12 hours away from bedtime.

4. Who should simply skip it

Very caffeine-sensitive adults and children under about 14. Teens should keep their total intake low, especially from energy drinks.

How to Learn Better & Create Your Best Future | Tim Ferriss

Guest: Tim Ferriss
Date: 2023-06-19 · Duration: 3:39:08
URL: https://www.youtube.com/watch?v=doupx8SAs5Y

KEYPOINTS

1. Stress-test any claim stated in absolutes
Ferriss says his starting point for The 4-Hour Body and later projects was the most dogmatic beliefs in a field. Whenever experts say 'always' or 'never,' he takes note. They may be right, but absolutes are what he tries to stress-test, using whatever new tracking tools are emerging. Around 2008–2009 that meant early accelerometers and continuous glucose monitors, then mostly limited to diabetics.

2. Look for the new, the very old and the orphaned
His idea-hunting buckets are genuinely new technology (an early, painful-to-insert Dexcom CGM), very old or forgotten interventions worth re-examining, and 'orphaned' ones. His example is doping compounds sourced from Soviet-era literature that testers were not watching for. He adds that a careful n-of-1 experiment, even blinded or placebo-controlled, can say a lot about causality.

3. The extremes inform the mean, not vice versa
Innovations tend to diffuse from edge cases: racehorses and people with wasting or terminal illness, then bodybuilders and elite athletes, then billionaires, then the rich, then everyone. Echoing William Gibson's line that the future is already here but unevenly distributed, he says he is not predicting so much as spotting seeds that are already sprouting. He assumes coaches whose jobs depend on results are 3–5+ years ahead of peer-reviewed papers.

4. Ask the questions that surface tomorrow's trends
With experts he asks what the technical nerds do on nights and weekends, what rich people do now that hundreds of millions may do in 10 years (e.g., a full-time assistant, now partly AI), and where people are 'cobbling together awkward solutions.' Then he asks for two unorthodox thinkers they follow and repeats the process.

5. Waiting for scientific consensus means waiting forever
Ferriss argues that if you need consensus before making decisions about diet, health or exercise, you will not get answers before you die. Instead he looks for interventions with plausible upside, a sensible mechanism, very limited downside and high adherence. Huberman notes that much of what we know about human memory came from a single patient, H.M.

6. Adherence is the slow-carb diet's main selling point
The rules: drink no calories; eat nothing white or that could be white (starches, including oatmeal), with exceptions like cauliflower only after the first two weeks; eat 30 g of protein within 30 minutes of waking. Build repeated meals from protein, vegetables, and beans or lentils, which add fiber and curb appetite. Avoid fruit and fructose during the week and take one cheat day. Ferriss says it is not for every sport but is cheap, has high adherence, and is his go-to reset when he drifts.

7. Bring a knife to a gunfight and you lose: delete social apps
For about two years Ferriss has kept almost no social apps on his phone. He argues they are engineered by skilled data scientists with billions at stake to overcome self-discipline. He also guards the ability to be bored for 5–10 minutes, for example waiting in line. Losing that, he says, makes you fragile and easy to manipulate.

8. Location and network density create 'surface area for luck'
Living in San Francisco put him 'one or two lily pads' from nearly everyone in self-experimentation, including the first Quantified Self gathering at Kevin Kelly's house around 2009 (12–13 people). If you are in growth mode with few obligations, he suggests spending 3–6+ months somewhere dense. That can be New York, LA, San Francisco or Chicago, or an emerging hub like Ottawa around Shopify or Pittsburgh around Duolingo.

9. Pick uncrowded, high-leverage bets, including in philanthropy
Ferriss funds mental-health therapeutics, especially psychedelics, because the field was uncrowded and $20,000–$50,000 can move the dial, unlike cancer research. He calls psychedelics 'the nuclear power of psycho-emotional surgery.' His approach to policy is the same as for books: break the problem into pieces, find the critical few, put them in order and execute.

10. Pain can become part of your medicine
Ferriss describes a planned near-suicide while taking a year off from Princeton. He also describes later going public about childhood sexual abuse in a conversation with designer Debbie Millman. He calls it the most important podcast he has released. Afterwards, about half of his high-performing close male friends privately disclosed their own abuse to him.

EXAMPLES

1. Trans-resveratrol and elbow pain
Testing trans-resveratrol to boost endurance, Ferriss developed what felt like tendinosis in both elbows. Later he found forums of people taking 500 mg daily who reported joint pain as the most common side effect. He decided the trade-off was not worth it. Huberman adds his own failure: Bulbine natalensis spiked testosterone, strength and aggression, then crashed below baseline after 7–10 days.

2. Moderator networking at South by Southwest, 2007
Instead of rushing famous panelists, Ferriss approached moderators and thanked them sincerely. If they hit it off, he asked who else there he might get along with and requested an introduction, then repeated the process. He says building 3–5 deeper relationships, rather than collecting contacts like 'Pokémon cards,' led to The 4-Hour Workweek's take-off in tech.

3. Night-owl writing schedule

During The 4-Hour Body he did research and interviews by day, then trained, often at Mission Cliffs climbing gym or with 30 kettlebells lining his hallway. He wrote from about 9–10 p.m. to 4–5 a.m. and slept until 11 or noon. He notes that many writers did their breakout work late at night or very early, though the schedule is hard on relationships.

4. Crowdfunding a Johns Hopkins psilocybin pilot

To test whether funding psychedelic research was reputationally dangerous, he seeded a crowdfunding campaign of roughly $880,000. It supported a Hopkins pilot of psilocybin for treatment-resistant depression, exceeded its goal and drew essentially no blowback. His Saisei Foundation later funded a UC Berkeley psychedelic journalism fellowship with Michael Pollan.

5. Week-long solo water fasts in nature

Ferriss periodically spends about seven days alone in nature with only water: no talking, reading or writing. He says it brings lasting benefits but has real risks. He argues most people suffer 'awe deficiency' because awe needs more breathing room than a gap between apps.

OTHER RELEVANT

1. Ratchet a goal down until you have no excuses

Instead of abandoning exercise because 4–5 hours a week feels impractical, shrink it. For example, a few kettlebell swings plus push-ups and core work a few times a week cover the posterior chain. Fewer moving parts means less cognitive overhead.

2. Use better questions to examine motivation

Ferriss keeps a collected file of questions. He borrows Seth Godin's inversion: if all five projects you are considering were guaranteed to fail, which would you still choose for the process? Questions, unlike statements, keep working in your mind for hours and days.

3. Capture research so you can find it again

He gathers material broadly, rereads it and marks anything worth revisiting with three asterisks, which rarely occur in normal text and are easy to search. He uses Scrivener to view research and drafts side by side.

4. Approach psychedelics with structure and supervision

After a dangerous unsupervised experience in college, he paused for years. He returned around 2012–2013 only with research, safeguards and facilitation, alongside other tools such as Transcendental Meditation. Both he and Huberman stress that these drugs are mostly illegal and powerful. If you are in crisis, contact a suicide hotline.

How Emotions & Social Factors Impact Learning | Dr. Mary Helen Immordino-Yang

Guest: Dr. Mary Helen Immordino-Yang
Date: 2023-06-05 · Duration: 2:41:22
URL: https://www.youtube.com/watch?v=S8jWFcDGz4Y

KEYPOINTS

1. Emotions are the foundation of thinking and learning, not an add-on

Immordino-Yang, who studies emotion, learning and adolescent development, argues that emotions drive all thinking, decision-making, relationship-building and well-being. That doesn't license acting on every feeling. It creates a responsibility to develop habits of questioning and reframing emotional narratives when they aren't serving us or the world.

2. Complex social emotions recruit the same body-regulating systems as basic ones

In her MRI studies, people heard true stories meant to evoke compassion or admiration. Emotions about physical pain and inspiring stories of virtue both engaged the brainstem, hypothalamus and anterior insula, the cortex that senses visceral states like heartbeat and digestion. Even our most abstract feelings are built on the physiology we share with much simpler animals.

3. For story-based emotions, valence matters less than whether you must build a narrative

Her surprise finding: once emotions are about stories, whether they're positive or negative is no longer the defining feature. What matters is whether you directly witness something (someone breaks an ankle stepping off a curb) or must construct a story in your mind (a man dining alone whose spouse of 75 years recently died). That narrative leap is uniquely human and develops slowly.

4. The default mode network activates during effortful meaning-making

Her team was among the first to show the default mode network actively engaging, not just switching off, during a demanding task: deciding how you feel about a story that requires cultural, contextual and personal knowledge. Stories that inspire admiration for someone's character or state of mind, such as Malala standing up to the Taliban, engaged it more than admiration for physical or cognitive skill.

5. Responses can be predicted story by story

In a two-hour interview before scanning, participants reacted to about 50 stories. The stories that individually inspired someone predicted which ones would activate these networks for that person in the scanner. Immordino-Yang calls this 'transcending' a situation: going from 'that's unfair to her' to what it means about the world and about oneself.

6. Adolescence is the developmental window for complex meaning-making

Young children can't fully appreciate others' mental states. Teenagers become driven to construct big meanings: their shoes become a statement about sustainability or counterculture. Yet that is exactly when school, she argues, doubles down on transactional testing, such as asking whether the servant in Great Expectations is Molly or Maria.

7. Dehumanization works by rewriting the story

Asked how people who love their families can take part in genocide, she explains that the narrative imposed on another's pain shifts from 'another human suffering' to 'a rat, a pig, a bug'. That brings a different set of values into play. Huberman connects this to classic obedience studies suggesting most people could harm others under the right conditions.

8. You can't think expansively when you feel unsafe

Default-mode activity, the basis of self-awareness and of building narratives, is fundamentally incompatible with vigilance about your immediate physical or social surroundings. Feeling physically, emotionally, culturally or socially unsafe makes it neurobiologically hard to imagine alternative perspectives, future outcomes or ethical implications. She notes creativity is also tied to these networks.

9. Mirror neurons as a special cell type haven't been found

She says that, as far as she knows, the predicted dedicated mirror cell type was never found. She prefers Antonio Damasio's late-1980s model of convergence-divergence zones, in which networks bring processing together and send it back out, linking perceiving others' actions with our own goal-directed action.

EXAMPLES

1. 'I love you more than I'm glad there's daytime'

At about two, her daughter Nora saw her looking sad, pressed her mother's arm to her face and said she loved her, adding that she really loved her arm. Two years later, Nora whispered from bed that she loved her mother more than she was glad there's daytime. Immordino-Yang argues the visceral attachment was the same; what had developed was the ability to conceptualize love as an idea.

2. Teens pausing during the Malala video

In experiments with teenagers, some covered their faces, closed their eyes or looked at the ceiling while watching. Coders watching with the sound off could spot these pauses. Afterward, speech slowed and posture closed, and students moved to bigger meanings, ethics, and themselves: 'I take school for granted; maybe I should do something for others.'

3. The seventh-grade question about hominids

As a young science teacher in a South Boston public school district, she built an integrated, web-like curriculum linking nuclear fission, the sun, photosynthesis and metabolism. A student bravely asked why early hominids in a Nova documentary always looked Black. Her answer about melanin near the equator opened months of discussion spanning biology and culture, which hooked her on studying development and learning.

4. Zeno's paradox and a student who never passed math

In a New York performance-assessment school, a Sudanese immigrant student who had never passed math spent months on a 'walking to the door' problem. If you keep going halfway, do you ever arrive? He said he learned fractions because he needed them, and became fascinated with finite and infinite. She quotes him in an article with Doug Knecht, 'Building Meaning Builds Teens' Brains'.

OTHER RELEVANT

1. Lead learning with meaningful problems

Start with what a learner finds interesting and give them real problems that require the skills: writing, math, argument, filmmaking. Skills are 'what's in the cart'; the aim is developing 'the horse' that pulls it. Assessments based on deep projects, like those in a consortium of New York City public schools that replace standard exit exams with performance assessments, are one model.

2. Interrogate your own default story

Ask what broader historical, ethical and civic implications follow from the narrative that feels like the truth, and invite others to tell you their version. Huberman deliberately follows social media accounts he disagrees with to keep perspectives in view.

3. Create psychological safety for hard conversations

Whether in a classroom or a heated discussion, people need to feel safe before they can explore alternative perspectives or be creative. Reduce threat first, then invite reflection.

4. Cold exposure when healthy; warmth when sick

Her teenage son had taken daily cold showers and reported no colds since. Huberman says short adrenaline spikes are protective while chronic stress isn't, citing Bruce McEwen and Robert Sapolsky. Once you're actually sick, he advises switching to warm showers, baths or sauna that aren't stressfully hot.

AMA #7: Cold Exposure, Maximizing REM Sleep & My Next Scientific Studies

Date: 2023-05-31 · Duration: 0:22:21
URL: https://www.youtube.com/watch?v=dicP_kA-RA0

KEYPOINTS

1. Brief deliberate cold exposure is unlikely to give you a cold by itself
Huberman's answer to the main question is 'probably not directly,' provided sessions stay in the typical range of about 1–6 minutes (10 minutes for people who really push it) and you warm up afterwards with clothes, a sauna or a hot shower. He sees no mechanism by which the cold water itself, assuming it is clean, would raise susceptibility to an upper respiratory infection.

2. Cold, dry air around the session is the more plausible risk
Laboratory studies that tightly control room humidity and temperature indicate that cold, dry air increases susceptibility to viral and bacterial infection. The nose, mouth and back of the throat are the main entry points, and their mucus lining traps pathogens. Cold, dry air thins and weakens that lining, while warmer, more humid environments keep it more robust. So shivering outside in dry winter air after a plunge, especially while mouth breathing, could plausibly raise infection odds.

3. If you are actually sick, skip deliberate cold exposure
His direct advice: if you feel malaise or fatigue because of a cold, flu or bacterial infection, stay out of the cold. That holds even though regular cold exposure can raise immune markers. He extends the same rule to hard exercise and stressful heat. Warm or hot baths, showers or a gentle sauna are fine, but not saunas hot enough to be a deliberate stressor aimed at heat-shock proteins or heart rate adaptation.

4. Mild symptoms are an edge case: warm up thoroughly if you go ahead
For a slight sniffle or feeling a bit run down, his first suggestion is the old-fashioned one: take a hot shower and go to sleep. If you are determined to plunge anyway, make sure to fully rewarm afterwards with a hot shower, bath or moderate sauna, and perhaps hot tea.

5. Repeated cold exposure nudges immune markers upward; one session does not
Across several studies, deliberate cold exposure increases the release and production of various immune molecules and cells, mainly when it is repeated over weeks. Huberman stresses that the effects are modest: in the key study they were trends, not statistically significant changes. Nobody yet knows how those shifts translate into real resistance to a given dose of cold or flu virus, which would be very hard to test.

6. Adrenaline and noradrenaline are the likely link between cold and immunity
Cold water and deliberate hyperventilation both release epinephrine (adrenaline) and norepinephrine (noradrenaline) in brain and body. Short-term spikes are pro-immune and can activate immune cells and molecules. But chronically high levels, especially repeated late in the day over many days, can reduce the number and efficiency of immune cells. He suggests thinking of 'can cold make me sick?' as 'what happens when I spike adrenaline?'

7. Suppressing symptoms is not the same as beating the infection
In the PNAS hyperventilation study (below), participants avoided fever and nausea partly because the adrenaline surge suppressed parts of the innate immune response. They still had endotoxin in their bodies; they just were not mounting a fever, which is itself an adaptation that heats up and helps kill an infection. Huberman admits he is 'saying two things at once': the same molecules can strengthen or dampen immunity depending on dose and timing.

8. Rest when sick because sickness behavior is adaptive
Infection activates brain 'sickness circuits' that push you to move less, curl up, look down and slump. Huberman frames this as a design for healing: the goal when ill is to devote the body's resources to fighting infection. A little gentle walking to circulate blood is probably fine if you are not bedridden.

9. Nasal breathing doubles as an infection barrier
He recommends nose breathing whenever you are not exercising hard, doing martial arts or talking. Zone 2 cardio and walking are good times to keep the mouth closed. Beyond reasons covered in other episodes, the mouth is a main site of entry for infections.

EXAMPLES

1. 'Immune System of Cold-Exposed and Cold-Adapted Humans'
Participants sat in 14 °C (57.2 °F) water, which Huberman calls very cool rather than cold, for a full hour, an intentionally extreme stimulus. A single exposure did not significantly change immune function. Three sessions a week for about 6 weeks produced trends toward higher plasma IL-6 and more T lymphocytes, T helper and T suppressor cells, and activated T and B lymphocytes.

2. PNAS: voluntary sympathetic activation and endotoxin
In 'Voluntary Activation of the Sympathetic Nervous System and Attenuation of the Innate Immune Response in Humans,' people were injected with E. coli endotoxin, which normally causes flu-like illness with fever, vomiting and diarrhea. Those trained in cyclic hyperventilation (Wim Hof or Tummo-style breathing: roughly 25 nose inhales and mouth exhales) beforehand avoided much of the symptomology. That happened through adrenaline-driven suppression of parts of the immune response, not a stronger one.

3. Typical real-world doses differ from the lab
Most people plunge in water in the high 30s to upper 40s °F for 1–10 minutes depending on conditioning, far colder but much shorter than the 1-hour, 14 °C study protocol. Huberman repeatedly warns beginners not to jump straight to 10 minutes.

4. Cambridge winter commute

Huberman recalls standing at a T station in Cambridge, Massachusetts in winter. Breathing cold, dry air there, after a run or even through the nose, dries the nasal passages and makes them more vulnerable. He uses it to show why the environment after a plunge matters more than the plunge.

OTHER RELEVANT

1. Feeling good: plunge freely, but do not stay cold too long

When healthy, it is fine to rewarm using your own metabolism and shivering. Still, don't stay really cold for more than about 10–15 minutes, or at most half an hour, after the session. Dress, get into the sun on a warm day, or take a hot shower.

2. Slightly run down: plunge only if you rewarm thoroughly

A hot shower, bath or non-stressful sauna afterwards, plus a hot drink, is his compromise. The safer default is simply a hot shower and an early night.

3. Genuinely ill: avoid all deliberate stressors

Cold, intense heat and hard exercise all spike stress hormones. Despite claims that cold 'boosts immunity,' rest and gentle movement are the better choice until symptoms resolve.

4. Time adrenaline-raising practices thoughtfully

Because chronic, late-day elevations of norepinephrine and epinephrine can blunt immune cell numbers and efficiency, avoid stacking frequent cold plunges or hyperventilation sessions late in the day.

The Science of Psychedelics for Mental Health | Dr. Robin Carhart-Harris

Guest: Dr. Robin Carhart-Harris
Date: 2023-05-22 · Duration: 2:37:09
URL: https://www.youtube.com/watch?v=fcxjwA4C4Cw

KEYPOINTS

1. Classic psychedelics are 'psyche-revealing'
Carhart-Harris, a pioneer of psychedelic clinical research, notes that 'psychedelic' means mind- or psyche-revealing. He argues that what makes LSD and psilocybin uniquely interesting, compared with psychedelic-like drugs such as ketamine, MDMA or cannabis, is how they bring previously unconscious material into awareness. Explaining that biologically is, he says, a major gap to fill.

2. Microdosing evidence is thin so far
Definitions vary. A microdose of LSD is around the perceptual threshold of 10–12 micrograms, often taken on a schedule such as one day on and one or two days off. Popularizers like Jim Fadiman argue a true microdose should be sub-perceptible. Claims of better well-being and creativity lack compelling evidence, partly because placebo-controlled take-home dosing over weeks is hard and costly. A New Zealand study he thinks was well designed showed promising mood effects in presentations but was unpublished at the time.

3. Don't calibrate mushroom doses from clinical milligrams
Trials use 25 mg of synthetic psilocybin. Carhart-Harris estimates mushrooms contain roughly 1% psilocybin (plus psilocin), 'maybe a little higher,' but stresses this is guesswork. Proper potency studies hadn't been done, and he warns people not to use his answer to dose themselves.

4. Psychedelic therapy is very different from taking a psychedelic
Sessions use an eye mask, music throughout, settled conditions and ideally two mental-health professionals, at least one of them a psychiatrist, clinical psychologist, psychotherapist or psychiatric nurse. Protocols are similar across sites. Two dosing sessions spaced one to three weeks apart are the default at Hopkins, Imperial and NYU. His anorexia trial uses three.

5. 'Trust, let go, be open' predicts outcomes
Mentored by Johns Hopkins guides Bill Richards and Mary Cosimano, his team adopted this mantra, which he attributes to Richards. Trust in the therapist, measured even by a single rating on dosing morning, predicts the quality of the experience and outcomes weeks or months later. Readiness to surrender and to be open also predict response, but openness can be terrifying for people carrying significant trauma.

6. Psilocybin reduces brain modularity, and this tracks recovery
During a trip, communication across brain networks increases. In two separate depression cohorts this decrease in modularity was still present the next day in one and three weeks later in the other. The size of the change correlated with symptom improvement. He cautions not to over-read it, since sharper analytical cognition is associated with more modularity. Depression, he suggests, is like a rut in a landscape: easy to fall into, hard to climb out of.

7. The 'entropic brain' effect scales with trip intensity
EEG shows brain activity becomes more complex, harder to predict and more informationally rich on psilocybin. The effect reliably tracks the strength of the subjective experience: the bigger the trip, the bigger the effect.

8. Placebo doesn't explain psilocybin's antidepressant effect
In the psilocybin-versus-escitalopram trial, participants generally expected more from psilocybin. Yet pre-trial expectancy predicted response to escitalopram on virtually every one of about 12 scales and predicted response to psilocybin on none. He calls it 'a smash on the head' for the placebo critique, while granting skeptics have a point.

9. Psychedelics dissolve the ego; cocaine inflates it
In one of his studies, dose-dependent measures cleanly separated drugs: cocaine increased ego inflation without touching dissolution, while psychedelics did the opposite. His hypothesis is that 2A receptors are densely expressed in evolutionarily recent brain regions.

10. MDMA therapy is more interpersonal, and suggestion plays a role
MDMA sessions involve more talking and less use of eye shades. People often feel love for those around them, making the work closer to talk therapy. MDMA teams encourage patients to listen to their 'inner healer,' language Carhart-Harris notes has been criticized as suggestive. He concedes suggestion is probably one of the vehicles of the therapy, and that honesty about this matters.

11. Combining psilocybin and MDMA is an open question
Underground therapists already combine the two. Carhart-Harris is interested because traditions often learn by trial and error, and in some patients sequencing the drugs might help. Psilocybin can reach 'the kernel of your suffering' but sometimes aggressively, which can overwhelm people with PTSD, while MDMA softens the emotional edge. Huberman stresses that such use is illegal and that the science should come first.

EXAMPLES

1. The do-it-yourself blinded microdosing study
Led by Balázs Szigeti at Imperial, participants put their own LSD microdoses into opaque capsules alongside empty placebo capsules, shuffled them, and tracked them with QR codes. Mushrooms were dropped because burping revealed the taste. Microdosing didn't compellingly beat placebo: people who got placebo but thought they had microdosed did as well as those who actually microdosed.

2. NEJM 2022: psilocybin versus escitalopram

One arm received two 25 mg psilocybin sessions. The other took escitalopram (Lexapro) for six weeks plus a very low 1 mg psilocybin dose. That let all participants be told they were getting psilocybin and allowed identical psychotherapy. Huberman likens the low dose to microdosing; Carhart-Harris says it was simply a necessary placebo.

3. First-ever psilocybin in middle-aged healthy volunteers

Participants averaged about 40 years old, were about half women, and had never used a psychedelic. They received 1 mg placebo, then 25 mg. All changes came with 25 mg: better well-being, the entropic EEG effect, and diffusion tensor imaging showing decreased axial diffusivity in two prefrontal tracts to the thalamus and striatum. That is a pattern resembling brain maturation, and the reverse of what is seen in aging.

4. Ongoing anorexia and fibromyalgia trials

His three-session anorexia trial, then 19 patients in with two to go, showed improved weight at long follow-up but was unpublished. Huberman notes anorexia is the deadliest psychiatric illness. A single-dose 25 mg fibromyalgia study for generalized chronic pain, with EEG recording, doesn't ask people to focus on their pain. Carhart-Harris said it was 'going very well' and cautioned against over-promising.

OTHER RELEVANT

1. Be skeptical of microdosing claims

Expectancy appears to drive most reported benefits so far, so personal anecdotes are weak evidence.

2. Context is part of the treatment

Rapport, eyes-closed sessions, music, trained guides and integration afterwards are core components, not extras. Recreational use lacks them.

3. Clinical, not casual

The evidence comes from screened patients in supervised trials with fixed synthetic doses. Mushroom potency is uncertain and self-dosing can go badly wrong.

How Psilocybin Can Rewire Our Brain, Its Therapeutic Benefits & Its Risks

Date: 2023-05-08 · Duration: 2:09:01
URL: https://www.youtube.com/watch?v=eIxVfln02Ss

KEYPOINTS

1. Psilocybin is a tryptamine that mimics serotonin
Psilocybin is a tryptamine, like DMT and 5-MeO-DMT, and in its active form, psilocin, it closely resembles serotonin. Stomach acidity converts psilocybin to psilocin. Huberman notes that about 90% of the body's serotonin is made in the gut, but brain serotonin comes from separate neurons, not from gut stores.

2. The serotonin 2A receptor is the key
Psilocybin acts mainly at the 5-HT2A receptor, which sits in specific brain areas and parts of neurons, notably the apical dendrites of cortical pyramidal neurons that connect laterally across regions. That selectivity, rather than general serotonin boosting, is what Huberman says drives both the acute experience and the later circuit changes.

3. Visual hallucinations come from dense 2A receptors in visual cortex
The visual cortex has very high 2A expression, so at sufficient doses people hallucinate with eyes open or closed. With eyes open, much of the session gets absorbed in outside visuals like geometric fracturing or melting faces. Experts running trials told Huberman that therapeutic benefit depends on keeping the eyes covered for most of the session.

4. Rewiring alone is not the goal; adaptive rewiring is
Huberman repeats that plasticity is not automatically therapeutic: brain injury and methamphetamine also rewire the brain, maladaptively. The aim is changes that help someone function better afterwards. Set, setting, eyes-closed versus open, music and dose all shape whether the plasticity is beneficial.

5. Psilocybin increases connectivity across brain networks
Imaging studies show more lateral, less hierarchical communication between brain areas after psilocybin, including at rest. Despite this reduced modularity, Huberman notes that long-term memory problems are rarely reported in depression trials.

6. Plasticity mostly comes from new connections, not new neurons
Huberman estimates neurogenesis accounts for perhaps 1–2% of meaningful adult rewiring 'and I'm being generous.' Psilocybin's effects in animal models involve growth of dendrites and dendritic spines, which are new sites for excitatory input. He notes that depressed humans show fewer spines in frontal cortex.

7. Dose conversions and the 'heroic dose'
Mushrooms average about 1% psilocybin, so 1 g of mushrooms holds about 10 mg. A 'heroic dose' of about 5 g therefore equals roughly 50 mg. Potency ranges from about 0.5% to 2% across strains, batches, age and storage, so 1 g could deliver 20 mg, or 3 g only 10–15 mg. Research uses synthetic psilocybin given orally or intravenously. Microdosing in research terms means 1–3 mg daily; therapeutic doses are 10 mg or 25–30 mg, once or twice.

8. A typical session has a predictable arc
Participants fast for at least four hours, since food changes gut acidity. Effects begin 30–45 minutes after dosing, peak around two hours with intense emotion and often anxiety (part of 'ego dissolution'), and taper toward about six hours. Clinical playlists follow this arc: quiet, mostly instrumental music first, then 45–90 minutes of louder, percussive music at the peak, then softer, melodic or choral music.

9. Extreme anxiety at the peak predicts worse outcomes
Some anxiety is expected, but extreme anxiety is negatively correlated with relief from depression. That makes trained guides who can help people through it in real time essential.

10. Strict exclusions and cautions apply
People with psychotic or bipolar tendencies, or even a first-degree relative with bipolar disorder, schizophrenia or schizotypal traits, are typically excluded from trials. Most studies enroll adults aged 25 to about 70. Trials require participants to be off serotonergic antidepressants, but Huberman stresses never stopping medication without a physician or psychiatrist, which he calls potentially catastrophic. Psilocybin remained illegal outside research and some decriminalized areas at recording.

EXAMPLES

1. NEJM, November 2022: single-dose psilocybin for treatment-resistant depression
About 75–79 participants per group received 25 mg, 10 mg or 1 mg (control) of synthetic psilocybin with psychological support. At week three, 25 mg gave significantly more relief than 1 mg. 10 mg did not differ from 1 mg. Adverse events occurred in every group and were most frequent at 25 mg, including headache, anxiety and suicidal ideation.

2. Two-session trial: effect sizes beyond SSRIs
In a two-session protocol with about 11 hours of supportive psychotherapy, the authors reported large, rapid and sustained antidepressant effects. Effect sizes were roughly 2.5 times those typical of psychotherapy and more than 4 times those of antidepressant drug trials. Across such trials, 60–75% of people with major depression report good experiences and substantial relief.

3. 'Psilocybin Induces Rapid and Persistent Growth of Dendritic Spines in the Frontal Cortex In Vivo' (Neuron)
In mice, psilocybin rapidly grew mushroom-shaped dendritic spines in the prefrontal-equivalent cortex, and the new connections persisted after the drug cleared. That may help explain lasting effects in people.

4. Network connectivity in healthy volunteers
A study from Robin Carhart-Harris's group imaged healthy people at rest before and after psilocybin or MDMA and found

expanded connectivity between networks such as the default mode network.

5. Physiological sighs during sessions

Huberman says Matthew Johnson's Johns Hopkins team has begun teaching participants the physiological sigh before sessions so they can calm themselves at the peak. This builds on a Cell Reports Medicine paper from the Huberman and David Spiegel labs showing it is one of the fastest breathing tools for reducing arousal. He describes the in-session data as preliminary and unpublished.

OTHER RELEVANT

1. Setting must be physically safe and supervised

That means no open windows, nearby traffic, bodies of water or chance of getting lost, and at least one, ideally two or more, sober people present.

2. Know your dose, not just your grams

Because mushroom potency varies about fourfold, gram amounts are unreliable. The trial evidence centers on 25–30 mg under clinical supervision, with higher doses carrying more adverse events.

3. Plan for integration afterwards

Huberman highlights that combining psilocybin with talk therapy outperforms either alone. The weeks after a session, while plasticity persists, are when therapy and reflection can turn changes into adaptive ones.

How Smells Influence Our Hormones, Health & Behavior | Dr. Noam Sobel

Guest: Dr. Noam Sobel
Date: 2023-05-01 · Duration: 3:13:16
URL: https://www.youtube.com/watch?v=cS7cNaBrkxo

KEYPOINTS

1. Humans have a remarkable sense of smell
Sobel, an olfaction researcher at the Weizmann Institute, pushes back on the idea that humans smell poorly. We detect mercaptan, the sulfur additive that gives cooking gas its smell, at about 0.2 parts per billion, which no machine matches well. He also notes that we smell through the mouth (retronasal olfaction) as well as the nose. He points out that a widely repeated claim about a billion receptors in a bloodhound's nose turned out to be made up.

2. Smell loss: training has better evidence than supplements
Olfactory neurons regenerate. But if a head injury completely severs the olfactory nerve at the cribriform plate, smell is lost for good. Sobel's rule of thumb for viral loss, including COVID, is that if smell hasn't returned within about a year to a year and a half, it probably won't. Because olfaction is 'use it or lose it', smell-training programs have strong evidence, more than alpha-lipoic acid, for which the evidence is 'not overwhelming'.

3. Not all 'smells' are olfactory
The trigeminal nerve also has endings in the nose and throat, so sharp sensations like lemon can come through it even when true smell is gone. 'Pure olfactants' such as coffee and vanilla stimulate only the olfactory nerve. They are a better test of whether real smell has come back.

4. The nasal cycle tracks your autonomic state
One nostril usually flows more than the other, and dominance alternates about every 2.5 hours on average. The switch becomes very pronounced in sleep. It is driven by the balance of sympathetic and parasympathetic activity. Sobel's lab built a 24-hour wearable 'nasal Holter' that logs each nostril's flow separately. From those recordings alone, they can tell adults with ADHD from those without, and whether they're on Ritalin.

5. Inhaling through the nose shapes cognition
Sobel's theory is that because the mammalian brain evolved around sniffing, with information arriving in bursts on each sniff, nasal inhalation came to time neural processing in general. In his lab, people performed a visuospatial task significantly better when trials started on inhalation than on exhalation. He and Huberman favor nasal over mouth breathing whenever possible.

6. Smell loss is an early sign of neurodegeneration
Smell loss is not diagnostic on its own, because there are many causes. But a large decline, such as smell becoming 50% worse within a year, is a bad sign for Parkinson's or Alzheimer's risk. Olfactory neurons are the one place the brain directly touches the outside world. Sobel says smell tests haven't become routine screening mainly because smell hasn't been effectively digitized.

7. We constantly sniff ourselves and others, mostly without knowing it
Sobel believes nearly all of our chemical social sensing is subconscious. People sample their own body odor all day and appear to compare it with others' odor.

8. Humans may lack a working vomeronasal organ, but chemosignals still work
In mice, the Bruce effect, named for the British scientist who described it in 1959, makes a recently mated female miscarry on about 80% of exposures to an unfamiliar male's odor. The human vomeronasal (Jacobson's) organ is considered vestigial, though Sobel isn't convinced it is completely non-functional. Human chemosignaling clearly exists through other routes.

9. Menstrual synchrony findings are contested
Martha McClintock published menstrual synchrony in Nature in 1971 as an undergraduate, then a 1998 follow-up showing that odors collected at different cycle phases had opposite effects on cycle length. Sobel notes that the findings were later widely questioned, partly because statistics on cyclic events are tricky.

EXAMPLES

1. The handshake study
Participants were secretly filmed in a waiting room before and after an experimenter came in and either shook their hand or didn't. After handshakes, people brought their hands to their noses and sniffed them, which nasal-airflow measurements confirmed. An odor-emitting 'James Bond' watch on the experimenter's hand altered how much people sniffed afterward. Sobel questions the popular 'show you hold no weapon' explanation for handshakes.

2. 'Click' friends smell alike
Same-sex, non-romantic friends who clicked instantly were more similar in body odor than random pairs, measured both by an electronic nose and by human smellers. In a nonverbal mirror game, body-odor similarity predicted which strangers would rate each other as likely friends. It did not predict how well they mirrored each other.

3. Repeated pregnancy loss and body odor
Most women identify their spouse's body odor at near chance. Women who had experienced repeated spontaneous pregnancy loss did more than twice as well, without being better at other odors. Brain imaging showed altered responses to unfamiliar men's body odor. Causation is unknown, and a causal trial is just beginning.

4. Hexadecanal, a baby-head odor molecule
In a well-validated aggression game against a computer opponent programmed to be a 'jerk', the barely smellable molecule

hexadecanal reduced aggression in men and increased it in women. Brain connectivity from the angular gyrus to aggression circuits explained the split. The insight was that babies benefit from both effects: less paternal aggression and more protective maternal aggression. Hexadecanal was later found in emitted baby-head odor.

5. Women's emotional tears

Tears from women who cry easily while watching films like 'The Champ' were collected. Recruiting produced about 100 women and one man. Sniffing the tears produced a drop of about 14% in men's free testosterone and dampened hypothalamic activity. Unpublished data under review suggest that it also lowers men's aggression.

OTHER RELEVANT

1. If you lose smell, train it

Smell a set of distinct odors daily. It's cheap and better supported than supplements. Test recovery with pure olfactants like coffee or vanilla rather than with sharp scents.

2. Notice big changes in smell

A sharp drop in smell over a year is worth raising with a doctor, especially with other risk factors. Don't panic about one bad day.

3. You can learn to scent-track

Blindfolded, ear-plugged, gloved people could follow an odor trail laid with scented twine buried in grass right away. After about 4 days of training, crawling speed was the only limit. Two nostrils helped. Sobel also reports that none of the 14 yogis who claimed willful nostril switching could actually do it.

Science-Based Mental Training & Visualization for Improved Learning

Date: 2023-04-24 · Duration: 1:59:47
URL: https://www.youtube.com/watch?v=0RYyQRQFgFk

KEYPOINTS

1. Visualization speeds learning but can't replace real practice
Huberman's central message: mental training is a complement. Done well, it makes learning faster and more stable, but it can't stand in for real-world execution of a cognitive or motor skill. Like any deliberate learning, it depends on focused attention during the session and on sleep afterward.

2. Principle 1: keep each visualization very brief, simple and repeated
Most people (roughly 90–95%) can briefly imagine a yellow cube beside a red rose, the opening riff of AC/DC's 'Back in Black', or the feel of chinchilla fur. Almost no one can sustain long, multi-sensory scenes. Effective sessions use sequences that take about 15 seconds or less, run over and over with high accuracy.

3. Imagined experience runs at the same speed as real experience
Roger Shepard (Stanford) found that the time needed to imagine and rotate an object scales with its complexity. Stephen Kosslyn (now at Harvard) found that mentally 'walking' between landmarks on a memorized island map takes time in direct proportion to the real distance. Imagining a golf swing therefore takes about as long as making one, and at the neural level imagery closely mirrors perception.

4. Principle 2: neural equivalence isn't learning equivalence
Although imagery recruits similar circuits, it improves performance less than real practice. Hour for hour, real-world training (physical or cognitive) always beats mental training, and mental training beats no training.

5. Principle 3: combining real and imagined practice adds depth
No one can flip an imagined bistable image (faces/vases) or impossible figure in the mind's eye, according to neuroimaging. Once people trace or draw the figure by hand, they can. Huberman uses this to show that real motor and perceptual experience is what makes imagery flexible.

6. Principle 4: give each practiced element the same label in both settings
Imagery is sharper for things with real-world labels; the brain is above all a face-recognition machine. So name the element, such as 'golf swing 1A' versus 'putt 1B', and use that same name in both real and mental practice. Labels have to match reality: 'you can't just lie to yourself and learn better.'

7. Principle 5: imagery tracks real perception, so use your eyes
Behind closed lids, people look up when imagining a tiled ceiling and down when imagining a rattlesnake on a trail. Inspecting a mouse's whiskers takes longer than locating an elephant's trunk, because you have to 'zoom in'. Deliberately moving your eyes toward what you're imagining recruits more of the real circuitry.

8. Visualize in the first person, and video of yourself counts
Imagining from the inside out (feeling your hands on the piano) is significantly more effective than watching yourself from across the room. Many strong studies used eyes-open protocols in which people watch looped video of themselves; brain imaging shows we process video of ourselves more like first-person experience than video of others.

9. Mental practice trains 'no-go' as well as 'go'
Huberman estimates that half to three-quarters of skill learning is suppressing wrong movements or words, a job of the basal ganglia. Imagery can improve this inhibitory side too, provided practice mixes go and stop trials.

10. You only gain from imagery on skills you can already sometimes perform
In nearly every positive study, participants could already do the real sequence. Imagery can raise success, for example from hitting the ball cleanly 10% of the time to more often, but it's a poor tool for something you've never managed. Once a skill is consolidated you can stop visualizing it and move on to a new one.

EXAMPLES

1. 50 imagined finger-tapping trials improved speed and accuracy (2022)
In 'Mental practice modulates functional connectivity between the cerebellum and the primary motor cortex', people imagined the 1-2-1-3-1-4-1-5 finger sequence 50 times and then performed it faster and more accurately. Transcranial magnetic stimulation showed increased net excitation from the cerebellum to motor cortex (M1) through reduced inhibition.

2. Stop-signal task: combined training nearly doubled some gains
Using Gordon Logan's task (press left or right within about 500 ms, but withhold the press when a red stop signal follows 100–350 ms later), a small study trained people once a day for five days. Physical-only and mental-only groups both improved, but combined training produced far larger gains, in some measures nearly double.

3. 10 hours real practice plus 30–60 minutes mental practice beats 10 hours real alone
Huberman's synthesis of the research: nine hours physical plus one hour mental does not beat ten hours physical. Mental training helps when added on top of the maximum real practice you can sustain.

4. An injured Stanford tennis recruit came back better
An anecdote from a Stanford psychology colleague, which Huberman labels as only an anecdote: the athlete reframed the layoff as extra time for mental training and returned better than before the injury. Studies of stroke, TBI and limb-injury patients also suggest imagery can maintain or rebuild skills.

5. Aphantasia and synesthesia can coexist

About 5–15% of people visualize poorly, and some can't at all (aphantasia). Research shows people with aphantasia can still have synesthesia, such as a friend who sees E-flat as amber, and that aphantasia correlates with more autism-spectrum traits. Huberman stresses that the causal direction is unclear.

OTHER RELEVANT

1. Protocol: 15-second epochs, 50–75 reps, 3–5 times a week

Fit as many repetitions of the brief sequence as you can into about 15 seconds (for example three 5-second golf swings), rest about 15 seconds, and repeat for 50–75 total. Do this 3–5 sessions a week. Don't obsess over exact timing.

2. Timing matters less than sleep

Huberman isn't aware of data showing mental practice must come before or after real practice. What matters is good sleep the night after either kind of session; he points to Walker and Stickgold's 2003 paper on sleep and the time course of motor skill learning. Avoid practicing when you should be sleeping.

3. Use imagery to calm yourself before public speaking

For nerves, loop a short scene of walking onstage and scanning the room while deliberately staying calm, or watch video of yourself doing it. This trains your autonomic state rather than specific words.

4. Who benefits most

Later research found no meaningful sex differences in visualization or its benefits. People over 65 may gain especially from combined mental and physical training, though it's unclear whether that reflects limits on how much physical practice they can do.

Neuralink & Technologies to Enhance Human Brains | Dr. Matthew MacDougall

Guest: Dr. Matthew MacDougall
Date: 2023-04-17 · Duration: 2:01:41
URL: https://www.youtube.com/watch?v=3ZGItIAUQmI

KEYPOINTS

1. The brain is a set of functional modules
MacDougall, Neuralink's head neurosurgeon, who trained at UC San Diego and Stanford, says watching a small tumor knock out one discrete function shows the brain is a collection of modules 'duct-taped together' in a bone box. Hormones, vision, sensation and movement can each fail independently.

2. The frontal lobes act as a filter on impulses
Rather than simply suppressing impulses, the frontal lobes let them through under control, like 'you can have it if you pay for it first'. MacDougall recalls a young car-crash patient with damage to both frontal lobes who, after surgery, openly propositioned his 80-year-old recovery nurse.

3. Deep brain structures are 'firmware'
Regions governing body temperature, blood pressure, hunger, sex and sleep are similar across species and more predictable when damaged or stimulated. The neocortex, the part that reasons and problem-solves, differs vastly between a fox and a human. One odd example: hypothalamic tumors in children can cause gelastic seizures, bouts of joyless laughter that have occasionally been fatal.

4. Laser ablation is changing tumor surgery
Through a 2 mm hole in the skull, surgeons pass a fiber-optic probe and heat a deep tumor while monitoring its temperature under real-time MRI. Tumors in the brainstem, motor cortex or Broca's area, once inoperable or catastrophic to remove, can now sometimes be eliminated with almost no aftereffects.

5. MacDougall thinks drugs will beat electrodes for boosting plasticity
Plasticity declines with age. Because broad rewiring means changing trillions of synapses at once, he thinks drugs such as psychedelics will do more than any electrode he expects to see in his lifetime, which is surprising coming from Neuralink's surgeon.

6. Neuralink's first goal is restoring 'digital freedom'
Threads thinner than a human hair, placed by a robot, would record from the intact motor cortex of people with high spinal cord injuries so they can control a cursor and keyboard by intention alone. Robots are needed because no human hand is steady enough to place micron-scale loops among densely packed surface blood vessels. A later goal is a spinal implant to bypass the injury and reconnect brain to body.

7. Decoding relies on smart software and patients who give feedback
Software adapts to the brain's firing patterns while the user learns the device. Neuralink holds the record bit rate for monkeys controlling a cursor, which MacDougall credits partly to Krishna Shenoy's lab. Human volunteers can say what they're trying, and Stanford work (Shenoy, Jaimie Henderson) has even decoded speech from the hand area.

8. MacDougall argues bit rate is the yardstick for brain interfaces
Like a modem's speed, the key number is how much useful information a device can move into or out of the brain. Wearables such as Neosensory's sound-to-touch wristband are easy to adopt but have low ceilings. Implants could in principle reach millions of neurons.

9. MacDougall says alcohol is the most common brain damage people choose
He says his patients near San Francisco's Tenderloin who've been heavy drinkers for years show brains 'like small walnuts' on scans. Huberman cites UK brain-imaging data showing near-linear thinning of gray matter with each additional weekly drink. MacDougall would like people to be far more wary of it.

10. The skull's one design flaw
The temple bone is among the thinnest in the skull, and the middle meningeal artery runs right beneath it, a feature surgeons call 'God's little joke'. A focused blow can fracture the bone and tear the artery, causing an epidural blood clot that crushes the brain. Fluid around the brain otherwise cushions it well.

11. Why some brains survive big lesions and others don't
MacDougall says species, age and redundancy explain the contradiction. Removing half the brain of a very young baby can still allow high function because the remaining half takes over. Adult humans, by contrast, lose discrete functions such as speech, finger control or part of vision from small lesions.

12. MacDougall's long-term vision
Within 10–20 years he hopes to tackle addiction, depression, suicide and obesity as brain malfunctions. For his children's generation he imagines cognition merged with AI and communication freed from the narrow 'flapping air past meat' bottleneck of speech. Texting by thought, he notes, is mostly an engineering problem rather than a neuroscience one.

EXAMPLES

1. An RFID chip in his hand
MacDougall implanted a passive glass RFID tag between his thumb and forefinger at his kitchen table, coated in extra silicone because he rock-climbs. It opened his front door and Neuralink's doors, and once stored a crypto wallet key that had gained a few thousand dollars when he remembered it. His wife later asked for one, and they consider them their wedding rings.

2. He'd take a Neuralink implant himself
MacDougall says yes, though the first version wouldn't help an able-bodied person. He believes the procedure is already safer than many standard FDA-approved surgeries he performs.

3. No water deprivation for the monkeys
Many labs motivate animals by restricting water. MacDougall says Neuralink monkeys like 'Pager' have full food and water and play games for smoothie treats only if they want to. Pigs serve as a skull-sized platform for testing safety.

4. Bluetooth headphones
MacDougall uses them and says their power levels are far too low to worry him, compared with the background radiation we're all exposed to.

OTHER RELEVANT

1. Protect your brain with the basics
Avoid head injuries and especially a second one, get any head injury treated, and cut back on alcohol. Huberman notes we don't yet know what chronic stimulant use (Adderall, modafinil) does to the brain.

2. Drowsy driving is a major risk
Huberman's reading of the data is that reduced alertness contributes to about a third of vehicle accidents. MacDougall notes that Tesla's cabin camera already tracks whether drivers' eyes are on the road.

3. How to take part
At the time, Neuralink was still working toward FDA approval and kept a patient registry for people with quadriplegia interested in future trials.

The Science of Healthy Hair, Hair Loss and How to Regrow Hair

Date: 2023-04-10 · Duration: 2:04:47
URL: https://www.youtube.com/watch?v=6ZrlsVx85ek

KEYPOINTS

1. Hair loss starts long before people notice it
By about age 50, roughly half of men and women have noticed significant hair loss, and up to 85% of them feel anxious enough to seek treatment. Huberman stresses that the loss is gradual from about 30 to 50 and is usually noticed only under bright bathroom light. Psychological state can affect hair color and growth, and hair changes in turn affect mood.

2. Each hair comes from a stem cell niche that needs blood flow
Below the skin, a bulb holds stem cells that build the hair's keratin from the bottom up, melanocytes that pigment it, a sebaceous gland whose sebum seals and protects the follicle, and capillaries supplying oxygen and nutrients. Growth is metabolically active, which is why so many folk remedies — scalp massage, tingling oils, avoiding hats, light devices — aim to raise blood flow. None of these alone robustly regrows hair.

3. Three phases: anagen, catagen, telogen
Anagen is the growth phase; catagen is when the hair recedes from the bulb outward; telogen is rest, when the bulb pinches off. Scalp follicles can re-enter anagen if stem cells, blood supply and the right hormonal signals remain. Because anagen is long, treatments take many months to show results.

4. Hormones are the accelerators and brakes
IGF-1 extends anagen, and cAMP signaling also supports growth. PDE (a phosphodiesterase) and TGF-beta 2 act as brakes. DHT, made from testosterone by 5-alpha reductase, shortens anagen and promotes catagen and telogen, so most treatments target DHT or the enzyme. Pattern hair loss reflects where androgen receptors sit on your scalp.

5. The 'mother's father' rule is a myth
You can't predict your hair loss from a photo of your maternal grandfather. Huberman says the androgen-receptor pattern is inherited through the mother's side, so logically you'd look to your mother's mother, but women's hair loss is usually less visible or hidden by longer hair.

6. Minoxidil works through blood flow, with real side effects
Oral doses range 20-fold, from 0.25 to 5 mg a day; topical is typically 5% once daily and can still reach the bloodstream through the follicle. Side effects can include fluid retention and raised prolactin (lower libido, lethargy). Huberman advises starting at the lowest dose, 0.25 mg orally. Like low-dose tadalafil (2.5–5 mg, which some doctors prescribe), it mainly preserves hair rather than reversing loss.

7. Topical caffeine may rival minoxidil for slowing loss
Caffeine inhibits PDE, indirectly boosting IGF-1, and appears to reduce stem cell death. Huberman cites head-to-head data showing topical caffeine about as effective as minoxidil for preventing loss, without the blood pressure or prolactin issues. He notes that much of the evidence is from cell studies and concentrations haven't been systematically tested. Use about three times a week. Drinking coffee won't help, since adenosine receptors elsewhere soak up most of it.

8. Finasteride is the most potent mainstream option, but dose carefully
Huberman says it can increase hair count by up to 20%, reduce loss in about 90% of users, and thicken hair 20–30%. DHT suppression is logarithmic: very low doses already cut blood DHT by about 50%, with diminishing returns up to 5 mg. His suggested starting points, ideally with a doctor and hormone monitoring: 0.5–1 mg oral daily, or 1 mL of 0.25% topical once a week. Wait up to about 25 weeks before raising the dose.

9. Post-finasteride syndrome is a serious, poorly understood risk
Mostly in men in their 20s and 30s, stopping finasteride has been followed by severely reduced libido and erectile function and depression, sometimes suicidal. Older men taking about 5 mg for the prostate rarely report it. Huberman suggests DHT may keep shaping the hypothalamus and the brain-genital axis into the 20s and 30s. Topical finasteride is reported to cause 30–50% fewer or milder side effects.

EXAMPLES

1. Dutasteride: faster, stronger, riskier
It inhibits all three 5-alpha reductase isoenzymes, cuts DHT by about 95% at 0.5–2.5 mg orally, and works roughly two to five times faster than finasteride. It also raises the risk of low drive, higher estrogen and prolactin, and gynecomastia.

2. Huberman's turmeric reaction
High-dose curcumin (about 1–2 g) inhibits 5-alpha reductase in some people. Huberman felt so terrible, confirmed in blood work, that he says he'd rather lose all his hair than take it again, while noting many people tolerate it well.

3. Botox for a 'squinting' scalp
Injections relax scalp tension to improve blood flow. People with cutis verticis gyrata (Shar-Pei-like scalp folds) regrew hair after Botox flattened the folds. It must be repeated, needs a skilled injector, and lacks large trials.

4. PRP is not stem cells
Platelet-rich plasma is your own spun-down platelets reinjected. For the scalp it costs thousands of dollars, shows moderate and transient success, and may work partly through the needling itself. Huberman warns that anyone claiming stem-cell injections in the US, Canada or northern Europe is likely injecting something else.

OTHER RELEVANT

1. Combine a mechanical and a chemical stimulus

Meta-analyses show combinations beat single treatments. Microneedling (needles 0.5–2.5 mm) creates micro-inflammation that reawakens telogen follicles. Paired with finasteride it produces the most robust regrowth Huberman has seen, though not a full head of hair on a completely bald scalp.

2. Gentler DHT-pathway options

Saw palmetto: about 300 mg a day (studies used 200–500 mg), split into two or three doses because it's short-acting, with side effects in about 1% of people. Ketoconazole 2% shampoo: two to four times a week, massaged in for 3–5 minutes. Avoid stacking so many that DHT drops too low.

3. Fix insulin resistance and iron

Insulin resistance can thin hair via reduced IGF-1 activity. Exercise and body composition come first. Myo-inositol at about 900 mg roughly 30 minutes before bed has the fewest side effects; berberine and metformin sharply lower blood sugar. Test iron rather than guessing; Huberman gives target levels of about 25–100 for women and 30–150 for men.

4. Be patient and start low

Raising a dose after a week or two misreads the long growth cycle. Lower the dose if side effects appear, but give any regimen months before judging it.

Leverage Dopamine to Overcome Procrastination & Optimize Effort

Date: 2023-03-27 · Duration: 1:58:49
URL: https://www.youtube.com/watch?v=K-TW2Chpz4k

KEYPOINTS

1. Motivation depends on peaks relative to your baseline
Huberman uses a 'wave pool' analogy. Your baseline dopamine is the water level that sets your general motivation and well-being, and peaks are waves rising from it. The two aren't independent. At baseline, dopamine neurons in the ventral tegmental area and nucleus accumbens fire about three to four times per second. Peaks come from bursts in that mesocorticolimbic circuit, and every big peak is followed by a drop below the prior baseline.

2. Craving is a dip below baseline, and reward prediction error sets the outcome
Thinking of a sandwich triggers a small peak, then a dip below baseline that you feel as wanting, which drives you to go get it. When you get it, your brain compares what you received with what you expected. Better than expected produces a bigger peak, and as expected returns you to baseline. A closed deli or a lousy sandwich drops you further below baseline. Feedback along the way (texts answered, progress made) keeps adjusting dopamine during pursuit, like a scoreboard.

3. Easy, steep peaks drain the pool and narrow pleasure
Because peaks are followed by troughs, and troughs trigger more craving, chasing fast, effortless dopamine sets up a vicious loop. Baseline falls, pleasure shrinks and pain grows. That's how addiction to substances and behaviors develops, which Huberman calls a pleasure-pain imbalance.

4. How much different things raise dopamine
Huberman cites approximate increases above baseline: food anticipation and eating roughly double dopamine. Caffeine produces roughly a doubling in prefrontal signaling, based mostly on animal data. Nicotine raises it about 150%, cocaine about 1,000% and methamphetamine 1,000–10,000%. Video games vary widely, five- or tenfold in enthusiasts and nothing (or even a decrease) in people like him who don't care for them. He stresses these are relative and individual.

5. Build baseline through daily foundations first
The 'water in the pool' comes from quality sleep, morning sunlight (5–10 minutes on clear days and longer when overcast, without sunglasses), nutrition including tyrosine-rich foods such as Parmesan cheese, and regular movement, whose circuits themselves engage dopamine. Non-sleep deep rest (NSDR, similar to yoga nidra) has been shown to raise dopamine reserves by up to 65%, while classic focused meditation isn't known to raise dopamine. These need renewing roughly every 24 hours.

6. Cold water gives a long-lasting rise in baseline
A study Huberman cites from a European physiology journal found that cold-water immersion up to the neck substantially increased dopamine and other catecholamines, roughly doubling them or more for hours. For a short-exposure, long-release approach, Huberman suggests 30 seconds to 2 minutes at roughly 37–55°F. Start warmer than you think you need and ease in over days. Do it early in the day, but not within about six hours after strength or hypertrophy training, because it can blunt those adaptations.

7. L-tyrosine can raise baseline, but use low doses
Tyrosine is the precursor for dopamine synthesis. Studies show it improves working memory in multitasking settings, with or without stress, when taken about an hour beforehand. One study's dose would have been about 10 g for Huberman's roughly 100 kg body weight, which he does not recommend. Others found effects from 500 mg to 1,500 mg taken 30–60 minutes before a task. He suggests starting at 250–500 mg early in the day, watching combinations with caffeine and other stimulants, and noting any crash.

8. Mucuna pruriens behaves more like a spike than a baseline lift
This velvet-bean extract is about 99% L-DOPA, the Parkinson's treatment. Huberman, who has tried it, says it can boost alertness, mood and perhaps libido and motivation. But it tends to produce a big peak followed by a crash that can include depressive symptoms, which is the opposite of a sustainable baseline increase.

9. Stacking dopamine sources erodes motivation
Huberman recounts years of combining caffeine and yerba mate with supplements like phenylethylamine and L-tyrosine plus music before workouts, then exporting the routine to grant writing and lab work. The peaks felt great, but over time he got troughs on days off and his love of training and science faded. He wrongly blamed 'adrenal burnout,' which he says doesn't exist as such. He now does many workouts and work sessions with only his usual baseline caffeine.

EXAMPLES

1. The children's drawing study
Researchers observed preschoolers who chose to draw in their free time, then began rewarding them for drawing. When the rewards stopped, the children spent less free time drawing than before. Parallel adult studies showed the same effect. External rewards for something you already enjoy can undermine intrinsic motivation.

2. Post-peak 'postpartum' slumps
After big experiences, such as a vacation, a night out partying or the birth of a child, a dopamine trough is common. Huberman notes that clinical postpartum depression has many causes, including hormonal ones, but the phrase is also used loosely for any post-peak drop in baseline.

3. Procrastination as trough-avoidance
When stuck, people often switch to tasks they don't normally enjoy, like suddenly cleaning the house, because those are less

painful than the trough they're in. That reinforces avoidance.

4. Growth mindset's 'yet'

Huberman cites Carol Dweck at Stanford and David Yeager at UT Austin. The core of growth mindset is reframing 'I can't do it' as 'I can't do it yet.' Huberman extends it into making effort itself the reward.

OTHER RELEVANT

1. To break procrastination, deepen the trough on purpose

If the basics are in place and you still can't get going, do something safe that 'really sucks,' such as a cold shower or ice bath (if you cringe just thinking about it, that's your tool), or a few minutes of the task itself. A steeper descent produces a faster, stronger rebound in dopamine and motivation. Keep a short list of about five such activities.

2. Use brief meditation as an effort tool

For people who find it hard, 5–10 minutes of meditation is effortful enough to work as a 'painful' reset available almost anywhere.

3. Tell yourself the effort is the reward

Subjectively attaching reward to the friction of effort, rather than only to the outcome, recruits the same dopamine system and helps sustain long pursuits. Avoid layering external rewards onto activities you already enjoy.

4. Be cautious with supplements and prescriptions

Prioritize behaviors first. Prescription and over-the-counter compounds that raise dopamine vary by individual metabolism, and any big peak brings a matching trough.

AMA #5: Intrusive Thoughts, CGMs, Behavioral Change, Naps & NSDR

Date: 2023-03-24 · Duration: 0:23:26
URL: https://www.youtube.com/watch?v=cp9GXl9Qk_s

KEYPOINTS

1. The public portion covers one question: how to 'abstain' from addictive thoughts

This AMA's title also lists CGMs, behavioral change, naps and NSDR, but only the first answer is publicly available. It deals with intrusive thoughts and narratives. A listener noted that Huberman had planned to ask Dr. Anna Lembke how to abstain when your 'drug of choice' is a thought rather than a substance or behavior, and that the conversation moved on before he did. This episode is his answer.

2. Lembke's 30-day reset works for substances and behaviors, but you can't go cold turkey on a thought

Lembke, who directs Stanford's dual-diagnosis addiction clinic and wrote 'Dopamine Nation', prescribes 30 days of abstinence to reset dopamine reward pathways for most substance and 'process' addictions, such as social media, video games, sex and food. Huberman notes the exceptions. You can't abstain from food. People with severe alcohol or opioid dependence can be at risk of dying if they quit abruptly, so they need a physician. Thoughts need a different approach entirely.

3. First, separate true OCD from being 'particular'

In clinical OCD, performing the compulsion doesn't reduce the obsession. It makes it worse: more hand-washing, more anxiety. Someone who is fastidious or exercises for two hours and then feels calm all day doesn't have the disorder. If the behavior grows, intrudes and degrades quality of life, it may. Huberman's advice: if it's classic OCD, see a psychiatrist. Effective tools exist, and they don't always mean medication.

4. What a thought is

Huberman lists sensations (converting light, sound, pressure or chemicals into neural signals), perceptions (your interpretation of them), emotions and actions. Thoughts are a fifth, looser category: internally generated perceptions that mix past, present and future. Thoughts run in the background as semi-structured 'chatter' and become structured when something external, like a question, demands it.

5. Two kinds of unwanted thoughts need opposite strategies

Some thoughts are merely intrusive and repetitive, like a song stuck in your head or replaying an event that isn't upsetting. Others are intrusive and disturbing, such as recounting a harm, something you witnessed, or a sense of having been wronged. Huberman says the two answers diverge sharply.

6. For repetitive but neutral loops, anchor attention outward

Get into actions and activities that pull your attention to the environment. The loop may keep running in the background at first but should fade as you practice focusing elsewhere. He recommends 5–10 minutes a day of eyes-closed meditation focused on breath or the area just behind the forehead. He calls improved focus perhaps the best-supported benefit of meditation, citing Dr. Wendy Suzuki's work at NYU and his own lab's studies.

7. For disturbing thoughts, move toward them, not away

Huberman treats disturbing intrusive thoughts as trauma-like. He uses Dr. Paul Conti's definition of trauma: an event that changes how your nervous system works so that you function less adaptively afterwards, which means not every bad experience is a trauma. Counterintuitively, the evidence says to get very close to the narrative around the trauma, ideally with a well-trained therapist, without re-exposing yourself to the event itself.

8. Write it out in detail, in complete sentences

Disturbing thoughts tend to be fragmentary and nebulous. Scripting the thought and its context on paper, in a structured way, reduces both its emotional load and its frequency over time. Some people feel relief after one session, while others need several. The goal is to turn a story that hijacks your nervous system into a known, repetitive, 'old boring story'. He contrasts this with both the outward-anchoring strategy and Lembke's 30-day abstinence model, calling it essentially your own form of trauma therapy, and stresses that the data favor getting close to the specific details.

EXAMPLES

1. Huberman's knock-on-wood superstition

In college he developed a habit of saying and knocking 'knock on wood'. When he suppressed the knocking out of embarrassment, it moved into his head as a silent mental ritual. The more he did it, the more he wanted to, which he calls 'OCD' in air quotes. What worked was writing down the worst possible outcome he feared, getting close to what the thought was really about.

2. The exercise example

Two hours of morning exercise that leaves someone calm all day isn't a disorder. Two hours that leaves them unable to concentrate, with growing and intrusive urges to exercise more, starts to fall under the umbrella of a true disorder.

3. Structured vs. unstructured thinking

Huberman says that if his idle thoughts were broadcast while he walked around, they'd be a mix of half-sentences and gibberish. When a friend stops him to ask about his day, his thinking becomes organized around their question and his memory. That shift is what outward anchoring uses.

4. REM sleep and emotional load

Huberman adds that sufficient rapid eye movement (REM) sleep is important for removing the emotional charge from traumatic experiences and intrusive thoughts, and points to his free sleep episodes and toolkit.

OTHER RELEVANT

1. A three-step triage

First, is it classic OCD? If so, see a psychiatrist. Second, if the thoughts are only repetitive, build focus through engaging activity and short daily meditation. Third, if they're disturbing, journal about them in detail, repeating until the emotion fades.

2. Don't try to suppress

Suppressing a behavior can push it into thought, as Huberman's superstition shows. Structure and attention work better than willpower against a thought.

3. Protect sleep while you do this work

Prioritize total sleep and REM sleep, since REM helps reduce the emotional charge of memories.

Intermittent Fasting to Improve Health, Cognition & Longevity | Dr. Satchin Panda

Guest: Dr. Satchin Panda
Date: 2023-03-13 · Duration: 2:49:06
URL: https://www.youtube.com/watch?v=7R3-3HR6-u4

KEYPOINTS

1. Time-restricted eating means a consistent 8–12 hour eating window, not a cut in calories
Panda separates classic intermittent fasting, which cuts calories on some days (alternate-day eating, the 5:2 diet, Valter Longo's periodic fasting), from time-restricted eating (TRE). In his lab's mouse studies, TRE animals eat the same calories as freely fed mice and still get health benefits. For people he defines it as all food and caloric drinks inside a consistent 8–12 hour window. Windows of 4–6 hours or one meal a day exist, but few people can keep them up.

2. Meal timing sets the clocks in your liver and much of your brain
Ueli Schibler's experiments around 2000–2002 showed that feeding nocturnal mice during the day made the liver clock follow food instead of light. Later work, including Panda's in 2009, found that brain regions just millimeters from the master clock (SCN), such as the dorsomedial hypothalamus, also track meals. His rule of thumb: the body needs about a day to adjust to each hour of shift, so a three-time-zone flight takes about three days.

3. Consistency lets your gut get ready for food
Saliva, stomach acid, nutrient absorption and liver metabolism all ramp up in anticipation of your usual first meal. Shift breakfast by 2–3 hours and the system starts guessing a new time, so food may arrive when the gut isn't prepared. Intestinal movement also slows a few hours after the usual last meal, which is why a late dinner can leave a 'food hangover' the next morning, even without alcohol.

4. In mice, when calories are eaten matters for lifespan, not just how many
In Joseph Takahashi's study, mice on 20% fewer calories spread across day and night lived about 10% longer. The same reduced diet eaten during the mice's rest phase (daytime) added about 20%. Eaten during their active night phase, within 2 or 12 hours, it extended lifespan about 35%. Body weight and composition were the same across groups, and standard markers such as glucose control and cholesterol didn't predict who would live longer.

5. Headlines saying TRE 'doesn't work' misread a narrow trial
In the widely reported human trial, participants already ate in about a 10-hour window. Both groups cut calories by roughly 25%; one kept 10 hours and the other ate in 8. A 2-hour difference producing similar weight loss isn't surprising, Panda says. Weight loss isn't the only endpoint either: reflux, mood and lipids can change at a stable weight.

6. Very short windows can cause relative energy deficiency (RED-S)
Squeezing food into one meal or a few hours tends to cut calories without your noticing. In active people that can lead to RED-S, which Panda says affects nearly 40% of athletes, often unknowingly. It can disrupt the hypothalamic-pituitary-gonadal axis, causing lost periods in women, along with bone loss and stress fractures, and has been linked to depression and anxiety. He suggests starting at 8–10 hours, and up to 12 for very active people.

7. About half of adults eat across 15 hours or more
Using the myCircadianClock photo app with 156 non-shift-working adults over three weeks, his lab found people ate a median of seven times a day, and the top 10% ate 12 times. About 50% had an eating window of roughly 14 hours 45 minutes or longer, and only about 10% ate within 12 hours. Surprisingly, people who cooked their own dinner tended to eat later.

8. Around half of people live like shift workers
Shift work is commonly defined as being awake and active for at least two hours between about 10 p.m. and 5 a.m., even once a week. Each such night takes about two more days to recover from. About one in five working adults are formal shift workers; add students, new parents and gig drivers and Panda estimates about 50% of adults. Shift workers carry more hypertension, diabetes, gut disease and some cancers, yet are usually excluded from trials.

9. Fire, then coffee, shaped the human evening and breakfast
Controlled fire gave humans a communal evening of cooking, storytelling, politics and song. Panda sees this as the root of our urge to eat and socialize late and of today's 'me time.' Historian Cemal Kafadar's work describes 16th-century Istanbul coffeehouses as an evening activity that later moved to the morning for dawn prayers. Strong coffee on an empty stomach caused heartburn, so people ate something first, which Panda says is how breakfast culture started there.

10. 'Night owl' identity may be shaped largely by light
Horacio de la Iglesia found that Argentine Toba people without electricity sleep about 3–3.5 hours after sunset, with bedtimes clustered within roughly 15–30 minutes of each other. Light sensitivity, measured by pupil response, varies by about a log unit between people and rises after puberty. True genetic outliers exist, such as familial advanced sleep phase syndrome caused by a PER2 mutation.

EXAMPLES

1. San Diego firefighter trial
All 155 recruited firefighters on 24-hour shifts followed a Mediterranean diet; about half also ate within a self-chosen, consistent 10-hour window, and most managed it 5 of 7 days. The TRE group improved VLDL particle size and number; those with high blood pressure saw drops a physician likened to an antihypertensive drug, and those with high glucose controlled it better. Alcohol intake fell only with TRE. Researchers first lived at the busiest station and found the whole crew wakes 10–20 times a night.

2. Swiss 12-hour trial
Tinh-Hai Collet's group compared standard Swiss nutrition advice with simply eating within 12 hours. Both groups lost similar modest weight over 3–6 months. Only the advice group improved food quality, cutting ultra-processed NOVA 4 foods, which suggests combining both approaches.

3. Camping resets supposed night owls
Ken Wright's grad students and postdocs, self-described night owls, went to bed between 9 and 10:30 p.m. while camping; Huberman notes the shifted rhythms persisted for weeks afterward.

4. Metformin timing in mice
Katja Lamia at Scripps gave the same metformin dose at different times of day and found its glucose-lowering effect changed dramatically. Panda suspects that metformin and rapamycin extend mouse lifespan partly by mimicking fasting in animals that snack when they should be fasting. Huberman reports severe hypoglycemia and an 8-hour headache from taking berberine without carbohydrates.

OTHER RELEVANT

1. Pick a window and keep both ends steady
Panda's suggestion is 8–10 hours to start, or 12 if you're very active or for children. Keep start and end times consistent at least five days a week, since swinging a meal by 3–4 hours creates a kind of 'metabolic jet lag.' Children can follow a 12-hour window naturally by finishing dinner 1–2 hours before bed.

2. Eat before coffee if you have reflux or anxiety
Caffeine on an empty stomach can trigger reflux and heighten anxiety or panic. Panda wakes at 6, eats breakfast around 8 and has coffee afterward.

3. Protect the dark hours
Even dim light (about 100 lux) during sleep has been linked to worse morning glucose. Huberman uses a red bulb at night and when traveling. Panda adds that five nights of shift-work-style sleep can push a healthy person's glucose into the prediabetic range, though these effects are reversible.

4. Be cautious with very low-carb 'fat fasting'
Panda questions the focus on avoiding every glucose spike. He wonders whether pancreatic islet cells lose function if rarely engaged, much as unused muscle weakens, and notes that insulin and IGF-1 support muscle protein synthesis and repair. Long supervised fasts, as in German fasting clinics, look safe with micronutrient and electrolyte support, but claims about mental health benefits remain preliminary.

How to Optimize Your Water Quality & Intake for Health

Date: 2023-03-06 · Duration: 2:22:23
URL: https://www.youtube.com/watch?v=at37Y8rKDlA

KEYPOINTS

1. Baseline hydration: about 8 oz ("H240 mL) per hour for the first 10 hours after waking
Huberman's rule of thumb works out to roughly 80 oz, or a bit over 2 liters, across those 10 hours. These are averages. You don't need to drink on the hour, and most people drink in boluses, such as 16 oz at once, which is fine. Exercise and heat needs are added on top of this baseline.

2. During exercise, use the Galpin equation
Taken from his series with Dr. Andy Galpin: divide your body weight in pounds by 30 to get the ounces to drink every 15–20 minutes while exercising. In metric, that is about 2 mL per kg of body weight on the same schedule. For an hour-long workout, the fluid from the Galpin equation can stand in for that hour's 8 oz baseline rather than being added to it.

3. Heat, sweating and caffeine raise fluid needs
In very hot conditions or with heavy sweating, increase the Galpin numbers by 50–100%. In a sauna, Huberman suggests 8–16 oz (240–500 mL) for every 20–30 minutes. When you feel parched, around 16 oz per hour is reasonable. Thirst is a decent guide but tends to lag behind actual dehydration. For caffeine, drink about twice the volume of non-caffeinated fluid, so 12–16 oz after a 6–8 oz coffee, ideally with electrolytes or a pinch of salt.

4. Even slight dehydration hurts focus, through a known mechanism
Mild dehydration impairs cognitive and physical performance, mostly through fatigue and brain fog. Fluid in the gut and bladder, and well-hydrated cells, raise sympathetic (alerting) nervous system activity in two ways. One is mechanical, through stretch sensors such as TRP and Piezo channels. The other is chemical, through water moving across aquaporin channels. The same alerting signal is what wakes you up at night with a full bladder.

5. How fast you drink changes how fast you urinate
The kidneys filter fluid fastest in roughly the first 10 hours after waking. Because the body senses stretch, gulping a lot of fluid quickly is excreted faster than sipping the same amount. Gulping during the day is fine, but later in the day sipping is better.

6. Most tap water contains contaminants worth filtering
After reviewing the literature and talking to toxicologists, Huberman calls the picture 'pretty grim' but fixable. He cites a 2020 review, 'Endocrine Disruptors in Water and Their Effects on the Reproductive System', which covers disinfection byproducts (DBPs) created when utilities treat water to keep it safe. DBPs can disrupt the endocrine system. He frames filtering as cheap insurance, especially for people with existing health issues.

7. Fluoride and thyroid function
Huberman points to a 2018 case-control study, 'Impact of Drinking Water Fluoride on Human Thyroid Hormones', which reported effects on TSH and T3 at concentrations as low as 0.5 mg/L. He notes it was a small case-control design, not a large trial. He suggests checking your local water report for fluoride, particularly if thyroid problems run in your family.

8. 'Hard' water with magnesium and calcium is likely good for you
A 2019 paper on EU drinking-water regulations quotes an inverse association between magnesium in water and cardiovascular mortality. Water with 8.3–19.4 mg/L of magnesium was linked to about 25% lower cardiovascular mortality than water with 2.5–8.2 mg/L. Huberman stresses this is an association, not proof that hard water prevents heart disease. Counterintuitively, hard water often tastes smoother.

9. Specialty waters probably work through pH, not magic
Huberman's interpretation is that hydrogen-rich, electrolyzed reduced and deuterium-depleted waters all have a higher pH, roughly 7.9–9.2. Less acidic water seems to be absorbed and used more readily, without changing the pH of your body or cells. Specialty waters are also filtered, which may explain some of their reported benefits.

10. Structured water lacks evidence
A 'fourth phase' of water, described by researchers at the University of Washington, does exist. But Huberman found essentially no peer-reviewed evidence that drinking it produces any specific benefit, and home systems cost hundreds to thousands of dollars. He calls it an interesting open question, not a recommendation.

EXAMPLES

1. Soldier cold-exposure study
Forty-nine men and women aged 19–30 did one 2-minute immersion per week at 3°C (about 37°F) plus at least five brief cold showers per week at about 10°C (50°F). Afterwards they warmed up naturally for 10 minutes. The study reported fat loss, especially around the abdomen, plus improvements in mood measures and sexual satisfaction. Huberman suggests easing in, for example starting around 50°F. He also notes that cold immersion within 6 hours after strength training can blunt gains, while cold showers don't appear to.

2. Søberg's 11-minutes-per-week finding
Dr. Susanna Søberg's work found that about 11 minutes per week of uncomfortably cold immersion, split across sessions and followed by natural rewarming, increased brown fat and metabolism. As far as Huberman knows, it studied only males.

3. Hydrogen-rich water trial
In a randomized, double-blind, controlled trial, drinking 1.5 L per day of hydrogen-rich water for 4 weeks reduced inflammatory markers such as IL-6 and cell death in peripheral blood cells. The effect appeared only in participants over 30. A two-part review argues that molecular hydrogen is the active agent in electrolyzed reduced water.

4. Huberman's dirty faucet aerator

Before researching the episode, he had never cleaned the small mesh filter at the faucet head. When he removed it, the back side was full of debris. Contaminants often come from pipes, pipe seals and uncleaned aerators, not just from the water source.

OTHER RELEVANT

1. Filter options by budget

Carbon pitcher filters (Brita-type) reduce DBPs if you change them often, but generally not fluoride. Huberman mentions a pitcher under about $80 (Clearly Filtered) that removes fluoride, lead and glyphosate, countertop systems like Berkey at $200–500, and whole-house filters at $2,000 or more. He says he has no affiliation with any of them. Filters let magnesium and calcium through.

2. Zero-cost option and what to avoid

If you can't buy a filter, let tap water sit uncapped (lightly covered with cloth) at room temperature for half a day or longer, then pour off and drink the top two-thirds. This removes some contaminants, not all. Don't rely on boiling, because heat can make some contaminants worse. Skip distilled water, which strips minerals. Reverse osmosis is safe but expensive and can remove magnesium.

3. Fewer nighttime bathroom trips

Hydrate well during the day. Then, from about 10 hours after waking until bed, limit fluid to about 5–8 oz and sip it rather than gulping. Waking once or twice a night to urinate is normal.

4. Optional: molecular hydrogen tablets

If your tap water has less than about 8.3 mg/L of magnesium, dissolvable hydrogen tablets are a cheap way to raise pH. Drink the water within 5–15 minutes. Use them once to three times a day, not in all your water, and never in carbonated or hot drinks. Huberman uses them himself and reports feeling better, while acknowledging possible placebo and limited studies. Drink water at whatever temperature you prefer: very cold water just absorbs a bit more slowly.

Genes & the Inheritance of Memories Across Generations | Dr. Oded Rechavi

Guest: Dr. Oded Rechavi
Date: 2023-02-27 · Duration: 2:32:01
URL: https://www.youtube.com/watch?v=CDUetQMKM6g

KEYPOINTS

1. Whether acquired traits can be inherited has a troubled history
Rechavi, who studies inheritance in worms, traces the idea's bad reputation to the early 1900s. Paul Kammerer claimed that midwife toads trained to breed in water developed dark mating pads (nuptial pads) and passed them to their offspring. The specimens turned out to have been injected with ink, and the scandal tainted the field for decades.

2. The 'memory transfer' experiments of the 1960s–80s collapsed
American psychologist James McConnell trained flatworms (planaria) to avoid shocks, then reported that worms regrown from cut-off tails kept the memory, and that untrained worms fed ground-up trained ones learned faster. Similar brain-transfer experiments followed in goldfish and rodents. Nobody could replicate the results reliably and the field ended in what Rechavi calls a catastrophe, though the idea of a memory in molecular form remains appealing.

3. Two barriers should stop experience from reaching the next generation
The first is the Weismann barrier, proposed by August Weismann in the 19th century and called the 'second law of biology': only germ cells (sperm and eggs) carry information forward, and they are kept separate from the body's other cells. The second is epigenetic reprogramming: about 90% of the chemical marks on DNA are wiped clean in sperm, eggs and the early embryo. Rechavi says 'epigenetics' is a heavily misused word, even by scientists.

4. In mammals there is evidence of effects across generations, but the mechanisms are unclear
Children of women who were starved during pregnancy in famines in the Netherlands, China and Russia showed differences in birth weight, glucose sensitivity and risk of some neurological diseases. Rechavi stresses that for most such effects the mechanism is still unknown, and that in mammals no system has been found that amplifies inherited RNA.

5. C. elegans worms pass small RNAs to their offspring
This tiny worm always has 959 cells, 302 of them neurons, each with a known name. Andrew Fire and Craig Mello won the 2006 Nobel Prize for showing that double-stranded RNA silences matching genes (RNA interference). Worms have no T or B cells and fight viruses with these small RNAs.

6. Without amplification, inherited RNA would dilute away within a few generations
Each worm has about 250 offspring, so after four generations any molecule from the original parent would be diluted about four-billionfold. An enzyme called RNA-dependent RNA polymerase recopies the small RNAs in every generation, which keeps them from running out. Effects typically last three to five generations, and his lab found 'MOTEK' genes that act as a clock setting how long the inheritance lasts.

7. Specific learned memories probably can't be inherited, but simpler states might be
Rechavi doubts that arbitrary memories stored in brain wiring, such as this conversation, could pass to children: even identical twins wire their brains differently. Simpler changes might pass on, for example a learned aversion that works by removing the receptor for one odor, which a single RNA could in principle control. That hasn't been shown convincingly in worms.

8. Germ cells can change behavior through the body
Germ cells secrete signals that shape the rest of the body and brain. Huberman describes his dog regaining his old personality on testosterone therapy. In mammals, small RNA changes in germ cells could alter very early development or the placenta and cascade into later metabolic problems.

EXAMPLES

1. Virus immunity inherited without the genes to make it
Working in Oliver Hobert's lab, Rechavi infected worms with a virus engineered to glow green when it replicates. The worms destroyed it. He then bred descendants that couldn't make small RNAs themselves, yet they still silenced the virus for several generations using RNAs inherited from their ancestors.

2. Starved and stressed parents
Starving worms affects their descendants for a few generations, and those descendants live longer, though he warns this could be a trade-off rather than an adaptation. In Isabelle Mansuy's mouse work, sons of stressed fathers showed less anxiety but had memory deficits. In Oliver Rando's work, offspring of nicotine-exposed rodents tolerated nicotine and other drugs better.

3. Heat-stressed parents and mate choice
C. elegans hermaphrodites usually fertilize themselves, and mating with rare males is costly. When hermaphrodites were stressed with heat, their descendants mated far more with males for about three generations. Disrupted small RNA inheritance impaired their sperm, so they released a pheromone that drew in males.

4. Cold makes worms remember far longer
His student Dana, skipping the experiment he'd assigned, put worms on ice after teaching them an association. They held the memory about 10 times longer. Worms first acclimated to cold forgot quickly, which showed that internal state, not just temperature, controls forgetting. The genes responsible act in a single pair of neurons, the only ones in the worm sensitive to lithium, a long-used treatment for bipolar disorder.

OTHER RELEVANT

1. Some inherited effects may be reversible

In rodent studies, overfeeding parents harmed their offspring, but letting the parents exercise corrected it. Rechavi expects the nearer-term use to be diagnostics: testing the RNA in sperm or eggs, much as DNA screening is already offered to most couples in Israel.

2. Mitochondrial replacement ('three-parent IVF')

The nucleus from a mother's egg is moved into a donor egg with healthy mitochondria, then fertilized. Huberman notes it is illegal in the U.S. but has been done several times elsewhere for mitochondrial disease. Whether the children will grow up healthy is still unknown.

3. Emotional arousal acts like a highlighter pen

Huberman connects the cold result to the medieval practice of throwing children into cold water to make lessons stick, and to adrenaline, which strengthens memory after important events. Rechavi wants to know whether such state switches depend on RNA.

AMA #4: Maintain Motivation, Improve REM Sleep, Set Goals, Manage Anxiety & More

Date: 2023-02-24 · Duration: 0:23:13
URL: https://www.youtube.com/watch?v=S8nPJU9xkNw

KEYPOINTS

1. The public portion of this AMA answers one question: how to keep motivation steady
This is a premium Ask Me Anything episode, and only about the first 15 minutes are free. In that section Huberman answers a listener, Martin, who swings between weeks or months of very high motivation, with side projects and music, and stretches of barely functioning and seeking short-term entertainment. He asks how to even out those extremes. The other topics in the title belong to the subscriber-only remainder.

2. Back on your heels, flat-footed or forward center of mass
Huberman borrows a mental image from a friend who served in special operations, then worked in finance and now in health and wellness. In any area of life you're either back on your heels (struggling), flat-footed (doing okay) or forward center of mass (tackling things and feeling in control). The goal isn't to stay maximally forward all the time, but to avoid crashing back onto your heels.

3. Dopamine governs willingness to put in effort, more than pleasure itself
Animal and human experiments show that people can still experience pleasure with very low dopamine. What disappears is the willingness to work toward any goal. Adequate dopamine supports effort. Excessively high dopamine, as in the manic phase of bipolar disorder, makes every idea seem like a great one, with so much energy that people stop sleeping.

4. Think of baseline dopamine as a wave pool
Using an analogy from Dr. Kyle Gillett, Huberman describes the pool's depth as your baseline dopamine reservoir and the waves as bouts of motivated pursuit. Waves that are too big, from too much excitement or too long at full drive, slosh water out and lower the reservoir. That depletion is what shows up as the low-motivation phase.

5. Refilling from empty takes far longer than topping up
Huberman describes an asymmetry: once the reservoir drops past a certain point, it takes much more sleep and rest to restore it than if you had topped it up from partial depletion. The common mistake is to push until exhausted and only then start using recovery tools.

6. Big peaks are followed by a lower baseline
Citing Dr. Anna Lembke and her book Dopamine Nation, Huberman explains that after large dopamine peaks, baseline drops below where it started, as if the pool got deeper and emptier at once. It then takes much longer to refill.

7. Stacking stimulants turns waves into tsunamis
None of these is bad on its own: caffeine (which increases dopamine receptor availability), favorite music, L-tyrosine, a workout, time with friends. Layering them repeatedly creates big peaks and a crash within hours or days. Huberman warns strongly against leaning on Adderall, Ritalin or illegal stimulants to fight low motivation, because their potent dopamine release depletes the reservoir further.

8. Celebrate, but expect a lull
Weddings, a birth, big anniversaries or a great sports outing with friends are worth enjoying fully. Huberman says to expect a dip afterward, 'not full-blown depression', unless you use tools to replenish. Likewise, you can combine caffeine, L-tyrosine, music and a workout sometimes, just not every day for more than a few days in a row.

EXAMPLES

1. Danish NSDR and yoga nidra studies
Huberman cites two studies from Denmark. In one, a yoga nidra practice of 30–60 minutes produced what he calls dramatic increases in striatal dopamine; he adds that newer data suggest benefits from as little as 10 minutes. A 2011 paper from the same group, 'Dopaminergic Stimulation Enhances Confidence and Accuracy in Seeing Rapidly Presented Words', found the practice also restored confidence and performance on a cognitive task.

2. Mucuna versus L-tyrosine
Huberman describes Mucuna pruriens as 99% L-DOPA, the dopamine precursor. He doesn't necessarily recommend it, because it tends to produce intense drive followed by a crash. He calls L-tyrosine milder, but says behavioral tools should come first.

3. Robert Knight's career advice
In graduate school, neurologist Robert Knight, then at UC Berkeley, told Huberman, who was about to go fishing, that the key to a demanding career is to figure out how many hours of real work a day you can do consistently, five days a week. Apply that number over and over, and update it every four or five years. As you get better, you do more potent work in less time, so the number usually goes down, not up.

4. The strength-training parallel
Huberman connects Knight's advice to one school of training. As people get better at controlling muscle contractions, or at stride and breathing in endurance sports, they can generate more adaptive stimulus per session and may train less, not more. Beginners can't get much done in a short time; experts can. Huberman admits he worked 'pretty insane' hours and even lived in his lab as a junior professor, which he doesn't recommend.

OTHER RELEVANT

1. Protect sleep as the main refill

Quality sleep with enough slow-wave and REM sleep (six hours for some, eight or more for others) is when the reservoir replenishes. Aim for good sleep on 80% or more of nights, supported by morning sunlight and avoiding artificial light at certain night hours.

2. Do NSDR daily, before you're depleted

Use a 10-minute non-sleep deep rest (NSDR) or yoga nidra session at any time of day, or 20–60 minutes if you have time, including if you wake in the middle of the night. Huberman stresses it isn't meditation: most meditation is a focus exercise, whereas NSDR restores energy and may help recover lost sleep. Free scripts are easy to find on YouTube.

3. Build a five-day neurobiologically consistent routine

Rather than a rigid schedule, keep consistent sleep, daily NSDR and controlled dopamine peaks for at least five days a week, along with good nutrition and social connection. Huberman says this produces a much more even pattern of focus and motivation. He calls it an art and a practice, not something to get perfect the first time.

Use Sleep to Enhance Learning, Memory & Emotional State | Dr. Gina Poe

Guest: Dr. Gina Poe
Date: 2023-02-13 · Duration: 2:05:41
URL: https://www.youtube.com/watch?v=BMTt8gSl13s

KEYPOINTS

1. The first 90-minute cycle is timed to your body clock
Most growth hormone is released in one big pulse during the first sleep cycle, along with a surge of protein synthesis that helps build memories. Poe explains that every cell's clock, timed relative to melatonin, expects this pulse at a particular time. If you go to bed late, you may still release some growth hormone, but your tissues have already moved on to the next phase.

2. Alcohol damages the memory-consolidating parts of sleep
Alcohol suppresses REM sleep and the sleep spindles of the stage-two transition into REM. During spindles, the hippocampus (the brain's RAM) writes memories to the cortex (the hard disk). Poe agrees with Huberman's suggestion of no alcohol in the 4–6 hours before sleep, or none at all, while saying she doesn't know the dose-response.

3. Later cycles are a different stage you shouldn't cut short
Each successive cycle contains more REM sleep, while growth hormone and melatonin decline and other hormones rise. Cutting the night short removes REM-heavy sleep, which is involved in consolidating memories and updating your mental models (schemas).

4. REM sleep clears the hippocampus by switching off noradrenaline
The locus coeruleus releases norepinephrine (and seems to be the hippocampus's source of dopamine), which strengthens synapses while you're awake. It falls silent only during REM sleep. Poe says that silence lets synapses weaken, erasing the 'thumb drive' once its contents have been written to the cortex, which is essential for continued learning.

5. In PTSD, the locus coeruleus may not switch off during REM
Norepinephrine levels in people with PTSD look normal during the day and early night but diverge in the early-morning hours, when REM sleep peaks. Heart-rate patterns point the same way. Poe's preliminary rat data agree. The traumatic memory then stays stuck in novelty-encoding structures instead of being erased after it's consolidated.

6. Common antidepressants may work against trauma recovery during sleep
Poe, stressing she isn't a physician, argues that drugs keeping norepinephrine in synapses (such as bupropion) suppress REM sleep, and that any REM sleep you do get is 'noradrenergic' REM. She thinks that may hinder the adaptive REM needed to resolve trauma. She says SSRIs are problematic too.

7. Sleep spindles track learning
Baseline spindle density correlates with intelligence. Whatever your baseline, an increase in spindles the night after learning almost perfectly predicts how well you consolidate the new information into existing knowledge. People with schizophrenia have very few spindles. Work by Julie Seibt and Anita Lüthi links spindles to plasticity in distal dendrites, which Poe thinks may support creativity.

8. You probably can't oversleep
In a study Poe describes where people could stay in bed 12 hours, they first slept 10–11 hours to pay back debt, then settled at about 8 hours 15 minutes and spent the rest of the time awake. Adolescents and other developing brains are the exception: let them sleep, because development has its own windows.

9. Opioid withdrawal leaves the stress system without its brake
Long-term opioid use reduces the number of opioid receptors. When the drug is withdrawn, your own opioids can't calm the locus coeruleus, which fires constantly, disrupts sleep and feels like anxious depression. Poe calls sleep disturbance a strong predictor of relapse, and her group (with Pamela Kennedy at UCLA) is testing whether restoring sleep reduces relapse in animals.

EXAMPLES

1. Psychedelics as a REM-like state
Poe describes psychedelic states as REM-sleep-like, though with major differences. She argues that current psilocybin and MDMA trials should be studying sleep, since none that Huberman knows of focus on it.

2. Children and fire alarms
Children's slow-wave sleep is so deep that loud fire alarms often fail to wake them. Poe notes efforts to design alarms that say the child's name, which is quieter but more meaningful to them.

3. Estrogen after trauma
Female rats' locus coeruleus fails to quiet fully in REM during three phases of the estrous cycle and quiets properly only during the high-estrogen phase. Poe cites retrospective studies of women in emergency rooms: those who happened to be taking a pill containing estrogen were much less likely to develop PTSD after a trauma.

4. Meditation and REM-like theta
Theta activity, which occurs during learning and REM sleep, increases during transcendental meditation. Poe suggests meditation might mimic some REM functions, but it's unknown whether norepinephrine and serotonin switch off, which erasing the hippocampus requires.

5. Sleep inertia
Waking from deep slow-wave sleep causes grogginess. Poe doesn't use an alarm except for flights and recommends waking

naturally when possible, while Huberman suggests timing alarms near the end of a 90-minute cycle.

OTHER RELEVANT

1. Pay back sleep debt with extra sleep

Poe says cognitive deficits build up with each night of sleep deprivation, and recovery requires actually sleeping more. That's also why the people in the 12-hour study slept 10–11 hours at first before settling at their natural amount.

2. Keep your bedtime consistent

Because the growth hormone pulse is tied to your circadian clock, regular bedtimes matter. Huberman says he's now keeping his bedtime within about ±30 minutes and reports better sleep scores and daytime vigor.

3. Go to bed calm, not anxious or wired

Going to sleep anxious or hyped up keeps the locus coeruleus active and can make sleep maladaptive. Poe suggests meditation, deep breathing, a warm bath or a comforting book, something neither too exciting nor too boring.

4. Use NSDR or yoga nidra for insomnia and middle-of-the-night waking

Relaxing the facial muscles, breathing with long exhales and doing body scans all push away from locus coeruleus activation and help you fall back asleep, though nothing replaces sleep itself. Poe notes insomnia feeds on itself: anxiety about not sleeping becomes the thing that keeps you awake.

Dr. Andy Galpin: Optimize Your Training Program for Fitness & Longevity | Huberman Lab Guest Series

Guest: Dr. Andy Galpin
Date: 2023-02-08 · Duration: 3:06:08
URL: https://www.youtube.com/watch?v=UIy-WQCZd4M

KEYPOINTS

1. Design the program in 10 steps, and pick exercises late

Galpin's sequence: set a specific goal, identify your "defenders," map the calendar, set days per week and session length, then select exercises, order them, set intensity, set volume, set rest intervals, and finally do "chaos management." No exercise is chosen until step five, because time and frequency limits narrow the options. Constraints create freedom, since choosing between two options is easier than choosing among dozens.

2. Make vague performance goals measurable with a proxy

"Feel better at the end of my round" depends on too much outside your control. Pick a measurable stand-in instead, such as a lower heart rate or faster heart-rate recovery after a regular 2-mile loop, or a faster 800-meter swim, and set something realistic like a 5% improvement in two months. Galpin's team uses the same proxy approach with pro athletes.

3. Identify your defenders: what's actually stopping you

Before choosing a program, figure out why past attempts failed: inconsistency, not knowing what to do, training hard without results, boredom, a gym that's too far, travel, frequent illness or old knee pain. Each points to a different program. A fat-loss plan from the internet may never address your actual point of failure. Galpin says life will win when it comes to kids and job, so fight battles you can win.

4. The quadrant system puts a budget on your energy

Adapted from Kenny Kane: divide 10 points across business, relationships, fitness and recovery. Huberman's split was 5-2-2-1, which Galpin calls the most common answer. Recovery should be at least half your fitness allocation and ideally 2 of 10, and it includes personal time, meditation, sleep and anything that restores you. If your fitness points can't support the goal and timeline, change the goal, the timeline or the split. Any change needs a concrete life action, not just "work less."

5. Underestimate your training time

Write deadlines, trips and family events on a physical calendar first, then plan backward. A 45-minute workout can become a two-and-a-half-hour block once travel, warm-up, showering and the transition back to work are counted. Schedule three days if you're sure of three. Extra time can always be added, but a plan you keep missing makes you feel like a failure and leads to quitting.

6. Balance across the week, and earn each progression

Balance movement patterns and muscle groups across the whole week, not within every session, and make sure any target (such as glutes) is checked off somewhere. Galpin's progression ladder for a movement like the squat: do it well with assistance, then unassisted, then with added load on the lowering phase, then holding the bottom isometrically, then adding the lifting phase, and only then adding speed and finally fatigue. This can take five minutes or two years depending on your injury history and confidence.

7. Put your top priority first, on your most reliable day

Generally do the most important exercise first in the workout and on the day you're most consistent in schedule and energy. Your week doesn't have to be seven days. Galpin ran a nine-day cycle for a Major League Baseball player who hit all-time velocity bests eight years into his career. Huberman puts legs on Monday, when he's most rested, and long cardio on Sunday.

8. Progress gradually, then deload

Galpin's rules of thumb: raise intensity about 3% per week and volume about 5 to 7%. Problems start above 10% per week. Adding a mile to each of three runs takes a 10-mile week to 13, a 30% jump. For lifting, total your weekly reps (three exercises of 3x10, three days a week, is 270) and add about 5%, for example going from sets of 10 to sets of 11. Progress for about six weeks, then deload to roughly 70% before building again, every four to eight weeks.

9. Rest intervals and chaos management

Rest 2 to 5 minutes between sets for speed, power and strength. Hypertrophy can use 30 seconds to 3 minutes, and endurance rest follows the type of endurance being trained. Last, look for likely failure points, like a disliked exercise or a clash with work, and solve them in advance. Your priorities then settle in-the-moment choices, such as a cut-short session or a hotel gym.

EXAMPLES

1. A year by quarters

Q1 (January to March): add muscle with a modest surplus of 10 to 15% (roughly 250 to 400 extra calories on a 2,500 baseline, not a "dirty bulk"), more sleep, three or four lifting sessions, an indoor sport and two long walks a week. Q2: get lean with a small deficit and outdoor sport as days lengthen. Q3: intervals and outdoor sport at maintenance calories. Q4: endurance with more calories, an indoor sport, trail running for proprioception and machines. Take a deload or vacation week between quarters.

2. The three-day template

Day 1: speed and power, then hypertrophy. Power goes first because fatigue would compromise it. Day 2: strength, then a high-heart-rate piece. Day 3: steady-state long-duration endurance. Use mostly whole-body exercises. Each session can be done in under 60 minutes, with 30 to 45 minutes of work.

3. The four-day template

Day 1: strength in the 5 to 10 rep range. Day 2: restorative long-duration work. Day 3: 11 to 30 reps or muscular-endurance work such as yoga, Pilates, a dance or spin class, or a circuit. Day 4: medium-intensity rolling intervals (for example one minute at 85 to 90% heart rate, one minute at 50%), finishing with 5 to 6 minutes near max, such as Galpin's 5-minute all-out assault bike effort. Sessions run in order rather than on fixed days, so a missed Monday just slides to Tuesday.

4. Drop Everything And...

At Barbell Shrugged, Galpin's team used "DETA" (drop everything and train at 3 p.m.). Huberman and Galpin extend it to drop everything and read, play or breathe. Limit yourself to one or two. Make the quadrant your phone background, post it at your "place of failure" (laptop, TV) and give it to an accountability partner.

OTHER RELEVANT

1. Timing exercise around sleep

Galpin says about 30-plus minutes a week in the top 10% of your heart rate tends to improve deep sleep if done well away from bedtime. Huberman cites papers suggesting hard exercise at least about six hours before sleep. If you must train late, extend post-workout down-regulation breathing. Galpin says some athletes' sleep complaints were solved by stopping 8 p.m. intervals. Huberman limits caffeine to before about 2 p.m., noting that caffeine in the hours before bed disrupts sleep architecture.

2. Exercise is not the same as physical activity

Lifting three days a week and sitting otherwise isn't optimal. Aim for roughly 150 to 180-plus minutes a week of low-intensity movement through walks, walking pads or exercise snacks. A nurse logging 15,000 steps may already cover it, but a desk worker likely needs deliberate walks. Galpin also wants at least one weekly session that challenges proprioception, such as a sport.

3. Hypertrophy reps versus strength reps

Sets of 15-plus reps build muscle as well as 5 to 12, but don't build much strength, so include some heavier work. Huberman recaps hypertrophy guidance from earlier in the series: at least 10, and more like 15 to 20, weekly sets per muscle, with 6 to 30 reps taken close to failure. Galpin adds that true failure is best saved for safer exercises.

How to Stop Headaches Using Science-Based Approaches

Date: 2023-02-06 · Duration: 2:26:44
URL: https://www.youtube.com/watch?v=CGjdgy0cwGk

KEYPOINTS

1. Knowing your headache type comes first, because the treatments differ
Huberman groups headaches by where the pain comes from. Tension headaches start in the many muscles over the skull, neck and jaw. Migraine and cluster headaches start deep in the nervous system. Hormone-related headaches follow drops in estrogen and progesterone. Headaches can also follow traumatic brain injury. Hormonal, tension and migraine headaches together make up more than 70% of headaches.

2. The meninges, blood vessels and inflammation create much of the pain
Much of the ache comes from the meninges, the protective layers around the brain, and the blood vessels and nerves that supply them. Changes in vessel width (dilation or constriction) and inflammatory signals activate these pain fibers, which is why caffeine, omega-3s and curcumin can all affect headache.

3. Migraine is a disorder of the nervous system, often with aura
Prevalence estimates vary widely (roughly 6–17% of men and 17–43% of women, depending on the source), and migraine is more common in women. Aura can be a visual halo or simply a sense that something is about to happen. Imaging links aura to 'spreading depression,' a wave of reduced electrical activity in neurons that moves from the visual cortex at the back of the brain toward the front. Sensitivity to light (photophobia) often comes first and can trigger the headache.

4. Cluster headaches come from the trigeminal nerve
Cluster headaches are felt as excruciating pain behind the eye. They arise from the trigeminal nerve, which has three branches serving the eye, the jaw and lip, and the nose. The herpes simplex 1 virus behind cold sores, carried by up to 90% of people, also lives in this nerve.

5. Low estrogen and progesterone drive hormonal headaches
Estrogen doesn't cause these headaches. The drops in estrogen and progesterone at certain phases of the menstrual cycle and around menopause change vessel dilation and the inflammatory response. Steroid hormones act both by changing gene expression and by binding the surface of cells.

6. Omega-3s at 1 g or more of EPA a day reduced headache in studies
A 2018 study of 12,317 U.S. adults, adjusted for calorie intake, linked higher intake of long-chain omega-3s with a lower prevalence of severe headache or migraine. A meta-analysis of doses from 200 mg to 2,000 mg a day found significant cuts in headache frequency and intensity only at about 1 g a day or more. Huberman's suggested target is more than 1 g of EPA a day from fish, fish oil or both. A systematic review also found omega-3s reduced PMS symptoms, including headache pain.

7. Cutting omega-6 linoleic acid while raising omega-3s worked even better
In a controlled trial, a diet with more EPA and DHA plus less linoleic acid (omega-6) produced what the authors called a robust reduction in headaches compared with a typical-intake control diet. The authors could only partly explain the mechanism. Omega-3s are anti-inflammatory and are built into cell membranes.

8. Caffeine can relieve a headache or worsen it, depending on timing
Caffeine blocks adenosine receptors, which constricts blood vessels, but it also acts on the nitric oxide pathway, which dilates them. When adenosine is high, late in the day or after poor sleep, caffeine mainly constricts vessels and may help. When you're well rested it tends to dilate them. Withdrawal in daily users reliably causes headaches, and Huberman is skeptical of the advice to drink coffee at night and then sleep.

EXAMPLES

1. High-dose creatine after brain injury
In a small pilot study, people with traumatic brain injury took 0.4 g of creatine monohydrate per kg of body weight a day (40 g for a 100 kg person) for six months. Headache frequency fell from about 90% in controls to about 10–12%. Huberman notes this dose is far above the usual 5 g a day and that the study was small. Creatine is stored in the forebrain as well as muscle.

2. Peppermint oil on the temples
In a study that induced headache-like pain by pressure, heat and a cuff restricting blood flow, peppermint oil applied to the temples and forehead, with or without eucalyptus, significantly reduced pain compared with placebo. Menthol and eucalyptus activate cooling channels in skin sensory neurons and quiet pain signals.

3. Botox and acupuncture for tension headaches
Botulinum toxin injected into tight forehead, temple or neck muscles blocks acetylcholine release, which relaxes them and can give relief for weeks or months. It's used in very low, local doses. Qiufu Ma's lab at Harvard Medical School has shown that specific acupuncture sites activate sensory pathways that reduce inflammation and muscle activity.

4. A pepper that caused a thunderclap headache
A man who ate a Carolina Reaper in a contest developed a thunderclap headache: sudden, extreme pain from severe constriction of arteries in the brain triggered by the pepper. Huberman's advice is to avoid it.

OTHER RELEVANT

1. Use dim red light during photophobia
If light sensitivity is starting, inexpensive red bulbs, even party lights, let you keep working without bright light. Huberman says the idea that heading off aura and photophobia might prevent the headache is emerging but not yet well tested.

2. Curcumin, with caveats

Studies paired about 80 mg of curcumin a day for eight weeks with 2.5 g of omega-3s and found reductions in migraine, partly through blocking nitric oxide. Sensitive people may respond to 25–50 mg. Curcumin can lower DHT and libido, and its strong anti-inflammatory effect may blunt training adaptations if taken before workouts.

3. Head injury symptoms can show up later

Many effects of traumatic brain injury appear hours, days or weeks after the impact. Repeated small hits, including heading a soccer ball, can add up.

How to Optimize Female Hormone Health for Vitality & Longevity | Dr. Sara Gottfried

Guest: Dr. Sara Gottfried
Date: 2023-01-30 · Duration: 2:35:05
URL: https://www.youtube.com/watch?v=GVRDGQhoEYQ

KEYPOINTS

1. Gottfried treats female hormones as one control system, not isolated glands
She broadens the HPA axis into a hypothalamic–pituitary–adrenal–gonadal–thyroid–gut axis. In teens this system is immature, so skipped periods under stress are common. Puberty has been moving younger than the old 12–16 range; she suspects toxin exposure and stress play a role.

2. The estrogen–progesterone 'tango' matters, and estrogen often leads too much
Gottfried describes estrogen dominance as raising the risk of fibroids, endometriosis and breast pain. She recommends getting baseline estrogen, progesterone and testosterone in your 20s and a full hormonal 'base case' in your 30s, so later replacement has a target.

3. Gut microbes help regulate estrogen through the 'estrobolome'
The estrobolome is the subset of gut bacteria and their genes that modulate estrogen, work associated with Martin Blaser. Some women's estrobolome raises their risk of estrogen-mediated conditions like breast and endometrial cancer, and in men prostate cancer. On stool tests she looks at beta-glucuronidase, an enzyme that can let used estrogen be recirculated instead of excreted. She concedes nobody yet knows what an ideal microbiome profile looks like.

4. Gottfried says being female is a health hazard in specific, measurable ways
She cites twice the rate of depression and insomnia, 3–4 times the risk of multiple sclerosis and 5–8 times the risk of thyroid dysfunction. The female colon is about 10 feet longer and more often tortuous. Combined with stress, borderline thyroid function and estrogen–progesterone imbalance, that makes constipation far more common.

5. Her definition of 'not constipated' is stricter than medicine's
The textbook definition allows infrequent bowel movements. Gottfried defines constipation, for her own Western context, as anything less than a daily morning bowel movement with a feeling of complete evacuation. She also connects it to stress, trauma and autonomic balance, using breathwork and meditation as tools.

6. PCOS is a heterogeneous syndrome with real cardiometabolic stakes
Diagnosis typically combines ovarian cysts, signs of excess androgens (hirsutism, acne) and irregular cycles, defined as longer than 35 days, but about four competing criteria exist. She wants it identified early, even in teens, because of links to insulin resistance and later cardiometabolic disease. Huberman's speculation that social stress or power dynamics might drive some cases is, she says, worth studying but unproven.

7. Oral contraceptives cut ovarian cancer risk but carry costs Gottfried thinks are under-discussed
About five years of use reduces ovarian cancer risk by roughly 50%, which matters because early detection (CA-125, ultrasound) is poor and symptoms like bloating are vague. Downsides she lists include depletion of magnesium and some B vitamins, a 2–3x rise in hs-CRP, a more rigid stress-hormone axis, thyroid effects and higher risk of inflammatory bowel and autoimmune disease. She dislikes synthetic progestins and says prescribing the pill 'at the drop of a hat' is a consent problem.

8. The 2002 Women's Health Initiative scared off millions from hormone therapy
Use fell to around 5% of women. Gottfried calls it the wrong study in the wrong patients with the wrong drugs: synthetic Premarin plus medroxyprogesterone acetate, powered for cardiovascular outcomes rather than breast cancer, and with an unusually low breast cancer rate in the control arm. Reanalyses show estrogen-only users (women post-hysterectomy) had lower breast cancer risk and mortality. Women aged 50–60, within 10 years of menopause (average age 51–52), saw benefits for atherosclerosis, bone and diabetes, while risks rose over 60.

9. Perimenopause can last a decade and comes with a measurable drop in brain energy use
It often begins with shorter cycles (28 to 25 days), poorer sleep and anxiety as progesterone falls. Gottfried cites Lisa Mosconi's PET work at Cornell showing about a 20% average decline in brain glucose uptake from premenopause to postmenopause. It is worst in women with the most hot flashes and night sweats, a pattern Mosconi links to Alzheimer's risk.

EXAMPLES

1. Copper IUD as her preferred contraceptive (short of vasectomy)
It is non-hormonal, lasts about 10 years, and Gottfried says it is roughly as effective as tubal ligation with the highest user satisfaction of any method, yet is the least used. She rejects the old training that it shouldn't be placed in women who haven't had a baby, while noting it isn't risk-free.

2. Rhodiola timing, an n-of-1
Huberman initially took Rhodiola rosea before resistance training, then moved it later in the day after realizing he wants the training cortisol spike; he subjectively reports more even afternoon focus. Gottfried says multiple randomized trials show rhodiola lowers cortisol, and suggests a washout and measured cortisol to make it a proper self-experiment.

3. Ibuprofen vs pro-resolving mediators
Citing Charles Serhan's work at the Brigham, she says ibuprofen cuts the amplitude of inflammation by about 50% but may block full resolution. For athletes' training aches she pairs fish oil with specialized pro-resolving mediator (SPM) supplements.

4. Fertility double standard

Women asking for hormone panels are often told levels vary too much or offered the pill. Once trying to conceive, the same tests (AMH, free testosterone, thyroid, estrogen, progesterone) are suddenly considered reliable.

OTHER RELEVANT

1. Gottfried's ranked basics

Food-first omega-3s: fatty fish about twice a week, fish oil (about 1,000 mg) on other days, ideally guided by an omega-3 index test. Then magnesium, since deficiency is common. Then vitamin D: 1,000–2,000 IU if you can't test, otherwise dose to a blood level of about 50–90 (she needs about 5,000 IU because of a receptor variant).

2. Cortisol tools with honest evidence grades

Rhodiola has randomized-trial support. Phosphatidylserine is 'super effective', and fish oil modestly lowers cortisol. Ashwagandha's human data are weak and come mostly from animal studies and Ayurvedic tradition; she uses a phosphatidylserine plus ashwagandha combination for people with high nighttime cortisol. A college student with normal cortisol is 'wasting their money' on PS.

3. Get a coronary artery calcium (CAC) scan by 45

Her one takeaway for women (and men) is a CAC chest CT by age 45, sooner with family history. It was about $250 self-ordered at Stanford, she notes, and is rarely offered by conventional doctors. A zero score means you can probably keep doing what you're doing; an elevated one is a fork in the road for cardiometabolic changes.

Dr. Andy Galpin: Optimal Protocols to Build Strength & Grow Muscles | Huberman Lab Guest Series

Guest: Dr. Andy Galpin
Date: 2023-01-25 · Duration: 4:39:23
URL: https://www.youtube.com/watch?v=CyDLbrZK75U

KEYPOINTS

1. Strength training is the main tool against neuromuscular aging
Galpin calls heavy-overload resistance training the only exercise route that preserves the nerve–muscle–bone chain behind independent movement. After about age 40, people lose roughly 1% of muscle size a year, but 2–4% of strength and about 8–10% of power. Older adults can have 30–40% fewer motor units. Power is what lets you stand up, catch a fall and move confidently.

2. It is never too late to start
Starting in your 20s is ideal, but Galpin stresses that a 50-year-old who has never lifted is 'not toast' and can reach a very good level quickly. Bone mineral density responds best to axial (vertical) loading. In his lab's program, women in their 20s and 30s with low bone density showed DEXA-measurable gains within eight months, alongside nutrition and hormone work-ups.

3. The '3 to 5' framework covers speed, power and strength
Train 3–5 days a week, choosing 3–5 compound exercises, doing 3–5 sets of 3–5 reps with 3–5 minutes of rest between sets. Doing one or two reps is fine; going above five is generally not. The range runs from 3×3 of three exercises three days a week up to 5×5 of five exercises five days a week. Progress the load by roughly 3–5% a week, using smaller jumps on lifts where 5 lb is a big change.

4. Power and strength differ mainly in load and intent
Power work sets use 30–70% of your one-rep max: up to 50–60% on a squat, closer to 30–40% on a bench. Strength work sets use 70% or more. In both cases intent is critical: you don't get faster by moving 'kind of fast'. With maximal intent you can build strength at 50% of max, or with zero load by squeezing hard during a plank.

5. Prilepin's chart caps how much heavy work is productive
Galpin uses the old weightlifting chart to dose volume by intensity. At 55–65% of max it prescribes 3–6 reps per set and 18–30 total reps, with about 24 as ideal. At 90% and above it is only 1–2 reps per set and about 7 total. Most working sets live in the 70–90% band, and going beyond the totals brings diminishing or negative returns.

6. Hypertrophy is forgiving but needs about 10–20 hard sets per muscle per week
Count sets where a muscle is a primary or secondary mover, so biceps count on chin-ups but not pull-ups. Exercise choice matters less than covering all muscle groups (rear delts and calves included) with movements you can push near failure safely. Consistency in exercise selection beats constant variation.

7. Rep range barely matters for growth, but proximity to failure does
Anything from about 4 to 30 or more reps per set can build muscle if sets end close to failure, roughly two reps in reserve. A set of 25 that only 'started to get hard' does not count. Citing a review from Eric Helms's team, Galpin says total failure isn't required. Use it on safer movements (a hack squat rather than a barbell back squat), and very advanced lifters may need it more often.

8. Six to nine reps is a blend, not a dead zone
Galpin jokes that students assume 1–5 reps builds strength, 8–12 builds size and 6–9 does nothing. In fact the 6–9 range gives a balanced mix of strength and hypertrophy.

9. Cardio interferes with growth mainly through energy and eccentric damage
The interference effect largely disappears if you eat enough. Choose endurance modes that spare the trained muscles' eccentric loading, such as cycling instead of running for leg growth. Moderate work, like 25 minutes at 70% of max heart rate, is unlikely to hurt. Best is a separate day, then a separate session, then cardio at the end of the lift.

10. Bracing is about intra-abdominal pressure, not holding your breath for oxygen
Treat the torso as a cylinder, like a sealed can that resists crushing, and push the belly out front, sides and back without lifting the shoulders. The Valsalva maneuver uses air for that brace. Galpin argues you should learn to breathe and brace at the same time, and says hugely overdeveloped spinal erectors can signal poor bracing.

EXAMPLES

1. Non-responders often just need a different dose
When a training partner triples in size and you don't, Galpin's data reported person by person often show non-responders need more volume. Plateaus can be broken by swinging to the other end of the range: heavier and lower-volume, or sets of 20–25 that cause less soreness.

2. Hidden stressors act like a foot on the brake
When athletes get sleep and other invisible stressors under control, soreness from identical workouts drops and they can tolerate more volume and more sets to failure. Galpin's rule is to take the left foot off the brake before pressing the accelerator.

3. No cold plunge on hypertrophy days
Despite owning a deep-freezer plunge, Galpin advises against ice right after, right before, or even on the same day as hypertrophy training. Cold blocks the gene-expression and protein-synthesis signal that triggers growth. In-season recovery

after games is a different goal.

4. Rear delts and neck

For the rear delts he suggests chest-supported reverse flys with the shoulder blades down and back, and points to coach Eric Cressey for shoulder-girdle detail. For the neck he prefers isometrics and avoids neck bridges, which he says can damage discs.

OTHER RELEVANT

1. Sequence accessory work after 3×5 work

Arm or calf hypertrophy work can be added after the main lifts, but high-rep work can hurt recovery for the next strength or power session. If your goal is purely power or strength, leave other training out.

2. Protein: about 1 g per pound (1.6–2.2+ g/kg)

Following Don Layman and Stu Phillips, Galpin says that if total protein is high enough, timing, type and leucine content matter much less, and plant proteins work too. Carbohydrate timing still matters for glycogen and training quality.

3. Creatine monohydrate, about 5 g a day, any time

Monohydrate has the largest evidence base. Smaller people may need about 3 g, and very large athletes 7–10 g. He calls timing irrelevant. Evidence is strongest for muscle; bone density and cognition benefits are being studied with mixed results.

4. Vary rest and intensity between workouts

For hypertrophy, rest anywhere from 30 seconds to 3–4 minutes depending on load and how close to failure you train. Take failure on the last set or in an occasional workout, and allow extra recovery when you do.

How to Optimize Fertility in Males & Females

Date: 2023-01-23 · Duration: 4:22:14
URL: https://www.youtube.com/watch?v=O1YRwWmue4Y

KEYPOINTS

1. Fertility depends on egg and sperm quality, not just quantity
Both eggs and sperm must shed half their chromosomes through meiosis, ending with 23 single strands. Spindle structures pull the chromosomes apart, and they depend heavily on mitochondria. When separation fails, usually in the egg but sometimes in sperm, the result can be failed fertilization, failed implantation, miscarriage or conditions such as trisomies. That is why many of the tools Huberman covers target mitochondrial health.

2. Monthly odds of conception fall steeply with a woman's age
With well-timed intercourse, the chance of conceiving in a given cycle is about 20% at 30 or younger, about 18% at 31 to 33, about 11% at 34 to 37, about 5% at 38 to 39, and roughly 1 to 3% after 40. Common OB-GYN advice is to try for about six months under 30 and nine months to a year in the mid-30s before seeking help. At 38 or older, Huberman suggests seeing a doctor at the outset.

3. Miscarriage risk also rises with egg age
About 25% of fertilizations in women 35 and older end in miscarriage, rising to about 50% by the early 40s. A common reason is chromosomal error when the egg ejects half its chromosomes in the polar body, leaving extra or missing chromosomes so the embryo cannot develop normally. Miscarriage can also arise from sperm or the uterine environment.

4. Know your reserve early: AMH and antral follicle counts
Each month a cohort of small antral follicles, about 2 to 9 mm, leaves the ovarian reserve. An ultrasound count across both ovaries (often 20 to 40 in a woman's 20s or 30s) and a blood test for anti-Müllerian hormone give a window into remaining eggs. Both decline over time. Huberman relays OB-GYNs' advice to measure several times, and earlier than most women do.

5. Men should get a semen analysis, roughly every five years
After 48 to 72 hours of abstinence, clinicians look for about 2 to 5 mL of ejaculate, a concentration of at least 15 to 20 million sperm per mL, and ideally 60% or more motile sperm. Normal-looking volume can contain few or no sperm. The urologists Huberman consulted recommend testing every five years and considering freezing sperm young, since paternal age is linked to some developmental risks, though absolute risk stays relatively low.

6. Heat is the enemy of sperm
Sperm take roughly 60 to 90 days to develop, so heat exposure affects a full cycle. The cremaster muscle raises or lowers the testes to regulate temperature, so boxers versus briefs makes little difference. Hot tubs, hot baths, saunas without a cold pack, long sitting, heated car seats and large thighs from fat or muscle can raise scrotal temperature.

7. Phones in front pockets may reduce sperm quality
Huberman cites a meta-analysis of 18 studies and 4,280 samples linking mobile phone use with lower sperm quality, through both radiofrequency and heat effects and regardless of usage time. He calls it likely one contributor, not the whole explanation, and advises keeping the phone away from the groin.

8. Alcohol, smoking and stress all impair fertility
Smoking damages egg spindles and mitochondria and raises reactive oxygen species in semen; that includes cannabis and vaping. A single binge of five or six drinks can affect sperm for the whole 60-to-90-day production window and the entire monthly cohort of follicles, partly by disrupting GnRH release in the hypothalamus. Huberman advises no alcohol while trying to conceive or pregnant, prioritizing sleep and keeping cortisol earlier in the day.

9. Infections and testosterone therapy can quietly lower fertility
Chlamydia often causes no symptoms yet raises the risk of ectopic pregnancy and miscarriage, so fertility clinics test for STIs. A significant viral illness in the prior 70 to 90 days can lower sperm count and quality. Testosterone replacement suppresses LH and FSH and can drastically cut sperm production unless offset, for example with hCG, FSH or clomiphene under a urologist's or endocrinologist's care. Supplements like tongkat ali, at normal doses, should not suppress natural testosterone.

EXAMPLES

1. Timing intercourse around ovulation
Abstaining 48 to 72 hours concentrates healthy sperm, and repeated ejaculations within 12 to 24 hours sharply lower concentration. The common recommendation is to abstain two or three days before ovulation, then have intercourse the day before and the day of. Experts disagree on the exact pattern, partly because men vary so widely. Some commercial lubricants may harm sperm even without spermicide, so ask an OB-GYN.

2. Tracking ovulation
Women use basal temperature, apps that log cycle start and temperature, and body cues. Libido rises just before ovulation alongside androgens, and cervical mucus shifts to support sperm. Sperm surviving several days in the reproductive tract gives some margin for error.

3. Mitochondrial supplements Huberman reviews
L-carnitine, 1 to 3 g daily for 30 to 60 days, has been linked to better egg and sperm quality; since oral forms can raise TMAO, he suggests 600 mg of garlic extract daily. CoQ10, typically 100 to 400 mg with a fat-containing meal. Myo-inositol, 1 to 5 g, starting low and taken later because it can be sedating; for women, D-chiro-inositol at 1/25 to 1/40 of that dose for androgen balance, relevant to PCOS. EPA omega-3s, 1 to 3 g. Discuss any of these with a physician.

4. Fasting and exercise

If a woman on time-restricted eating keeps regular cycles, it is probably not hurting fertility; lost periods usually mean too few calories for activity level. Do not start fasting during pregnancy without medical advice. In men, excess body fat is the main concern.

5. Positioning after intercourse

The physicians Huberman consulted split evenly. One group recommended lying back for about 15 minutes with the pelvis tilted about 20 degrees; the other said sperm reach the egg regardless.

OTHER RELEVANT

1. Plan three months ahead

For men, changes in heat exposure, alcohol, smoking or illness take a full 60-to-90-day sperm cycle to show up.

2. Use cold to cool and to time stress, safely

Cold that is uncomfortable but safe, done early in the day, may help indirectly by lowering testicular temperature and concentrating cortisol release in the morning. It is optional, not required.

3. Check supplements for hidden testosterone

Some blends have been found to contain testosterone, which could suppress sperm production.

4. Acupuncture has supportive reviews

Huberman points to a 2021 review of systematic reviews on acupuncture and herbal medicine for female fertility, plus reviews in men suggesting effects on blood flow and endogenous testosterone.

Using Meditation to Focus, View Consciousness & Expand Your Mind | Dr. Sam Harris

Guest: Dr. Sam Harris
Date: 2023-01-02 · Duration: 4:21:55
URL: https://www.youtube.com/watch?v=-wIt_WsJGfw

KEYPOINTS

1. The self that meditation deconstructs is the feeling of a subject behind your face
Harris is careful about which 'self' he calls an illusion. Your psychological continuity, memories and identity as a distinct person are real. What doesn't hold up under inspection is the felt sense of a separate observer inside the head, a passenger in the body appropriating experience 'from the side'.

2. Distinguish consciousness from its contents
Harris frames everything as consciousness (the fact that experience is lit up at all) versus its contents (thoughts, emotions, sensations, perceptions). Most people approach meditation as a way to change contents, getting rid of anxiety and cultivating calm or love. That is possible, but he says the core insight of the 2,000-year-old practice is recognizing what consciousness is already like, whatever its contents.

3. We lose the sense of self constantly without noticing
Harris compares it to saccades. We move our eyes about three times a second, and the brain suppresses vision during each movement using a copy of the motor command, so we are briefly blind without realizing it (jiggle your eyeball with a finger and the world shakes because no such copy is made). In a similar way, the self drops out whenever attention is fully absorbed. He suggests this is why flow and peak experiences feel so rewarding.

4. Almost no one can attend to anything for 30 seconds without getting lost in thought
Harris claims that without substantial concentration training, no one could keep attention on the breath for 30 seconds without being pulled into inner conversation, even if their life depended on it. On a silent retreat, feeling more distracted as the days go on is actually a sign of progress, because you're finally seeing how distractible you are.

5. Mindfulness means noticing thoughts as thoughts, not stopping them
Harris defines mindfulness as careful attention to the contents of consciousness, as distinct from being lost in thought. Thoughts can keep arising; the point is to see language and images as spontaneous appearances in consciousness. Practice usually starts with the breath as an anchor and then, often within the first week, opens up to sounds, bodily sensations, moods and finally thoughts themselves.

6. Concentration practice is a useful but 'brittle' tool
Single-pointed focus on the breath, a mantra or a candle flame can make the body and hearing seem to disappear and produce 'druglike' states, along with calm and smoother emotions. Harris values this but sees it as a tool, not the goal. Mindfulness has the advantage of being compatible with any experience because it doesn't artificially narrow attention.

7. Vipassana breaks experience into tiny sensations, which can ease pain
Classic vipassana pays close attention to seeing, hearing, touching and so on until 'hands' dissolve into a cloud of brief sensations of pressure and temperature. Applied to pain, Harris says much of the suffering comes from resisting and worrying about it (why did I do this, did I herniate a disc). Simply feeling it, the pain breaks apart into shifting sensations, and equanimity becomes possible. He notes that people tested after a three-month retreat could make finer perceptual discriminations.

8. Thoughts simply appear, which undercuts the sense of control
Harris's demonstration: think of a city and notice that one name just arrives, such as Huberman's 'Minneapolis'. You can't summon names you don't know, and among those you do know you don't choose which one surfaces. The reasons we give afterward are often confabulated. He contrasts this with Karl Deisseroth's nightly practice of thinking in complete, punctuated sentences for an hour, arguing that even then you don't know what you'll think next.

9. Progress comes in two step-changes
The first is clearly experiencing the difference between being lost in thought and being aware, including of thought. The second is noticing that no one is doing the noticing: awareness has no center and no place from which attention is aimed. Harris stresses this is a claim about experience, not metaphysics: 'I'm not saying the mind isn't what the brain is doing.'

10. Psychedelics change the contents of consciousness; meditation reveals its nature
Harris sees the two as complementary but different in kind. Psychedelics were indispensable for him at 17–18 in proving that looking inward was worth doing; he doubts he would have stuck with meditation otherwise. He separates MDMA (an empathogen that doesn't alter perception the way classic psychedelics do) from LSD and psilocybin, and warns that bad trips happen and that people prone to schizophrenia or bipolar disorder should almost certainly avoid them.

EXAMPLES

1. Anger with and without mindfulness
Brooding over reasons to be angry keeps the anger going. Once you notice thought as thought, the anger becomes a 'meaningless inner incandescence' with a short half-life, and you can choose whether to stay angry for one minute or ten instead of being 'the hostage of that'.

2. Can't get to Central Park from here: the clenched fist
Harris uses the parable of a stranger telling a lost tourist 'you can't get to Central Park from here' to show that the seeking self can't travel to the goal. Like a fist trying to become an open hand, the fist doesn't make the journey; it comes apart.

3. Ambushing Richard Dawkins with a guided meditation

Harris says Dawkins closed his eyes, found 'nothing of interest to see' and lacked the interest to persist. By contrast, he notes, with a dose like 100 micrograms of LSD 'there's just no possibility that nothing's going to happen'. He recalls the MAPS MDMA trial dose as 125 mg with an optional 75 mg booster.

4. Quitting Twitter on Thanksgiving

Harris checked it at least a dozen and sometimes 100 times a day, and says many of his worst professional episodes started there. As a political centrist criticizing both sides, he had no tribe defending him, and he was forming darker views of real friends than face-to-face life ever justified. He describes the result as almost wholly positive, with a recognizably addictive pull he no longer feels.

OTHER RELEVANT

1. Try the 30-second test, then start broad

Pick an object such as the breath, time 30 seconds and notice how often thought steals your attention. Then practice returning, and gradually widen attention to sounds, sensations, emotions and thoughts instead of fighting them.

2. Feel strong emotions as raw physiology

Before a talk, anxiety looks like a verdict on who you are. Felt directly as cortisol and sensation, Harris says, it 'no more maps onto the kind of person you are than a feeling of indigestion'.

3. Don't wall meditation off from the rest of life

Harris still sits formally but misses days. He has designed his life so that a two-hour hike is the same practice as sitting. He warns against 'banking' meditation in one compartment while the rest of life stays unexamined.

4. Reorient toward process over achievement

Achieving a goal has a tiny duration and a short half-life. Harris points to a 'double dissociation': people can have everything and be miserable, or have almost nothing and beam with joy. He argues the scarce resource is free attention that can rest in the present.

How to Become Resilient, Forge Your Identity & Lead Others | Jocko Willink

Guest: Jocko Willink
Date: 2022-12-26 · Duration: 4:04:27
URL: https://www.youtube.com/watch?v=__RAXBLt1iM

KEYPOINTS

1. The military's blank slate rewards performance with autonomy
Willink says that when he enlisted, nobody cared about his grades, SAT scores or past titles. If you did a task well, you earned recognition and more control over your own destiny, which he calls 'the ultimate in compensation for human beings'. He came to see that choices that invest in your future, rather than undermine it, steadily improved his life.

2. Order in peacetime versus flexibility in combat
Drawing on the book The Psychology of Military Incompetence, Willink notes the military attracts authoritarian personalities. They do well in 'garrison', the predictable noncombat world of parades and schools. Combat is chaos ('the enemy has a vote'), and there the open, flexible, input-seeking people do best, though they often struggle with garrison inspections. The ideal person can do both.

3. Exercise reliably gives you energy
Willink's workouts run anywhere from 8 minutes (2,000 m on the rower before a flight) to 3 hours when the surf is flat. 'If you go work out, you're going to feel better,' unless you go 'psycho', which he does only occasionally. Huberman adds the science: the morning cortisol peak is meant to happen. Morning sunlight raises it by about 50%, and exercise adds another 50–75%, setting up energy, focus and immune function for the day.

4. Leaders should steer against their team's mood
A unit's morale behaves like a mob. After a perfect mission, the leader steps back and insists on a debrief and gear maintenance to head off arrogance. After casualties, the leader names what went wrong, asks what everyone, starting with the leader, can do better, and points the team toward the next mission. To do that, you have to stay detached from the group's emotions.

5. SEAL selection weeds out people who can't recover from losing
Many Division 1 athletes, wrestlers and swimmers quit Navy SEAL training because they've never learned to lose. The training deliberately finds your weakness and exploits it. Those who finish arrive already able to take a loss and get back up.

6. Detachment is 'a superpower'
'The solution to your problem is not going to be found in the problem.' Stepping back lets you judge whether something even needs solving. Most things get an 'OK, roger that, carry on', and some need only a small adjustment. He applies it to firefights, merging company cultures and arguments with a partner.

7. Narrow focus constricts vision and thinking, wide focus opens both
Huberman explains that narrowing your gaze on one target constricts your view of the world and gets the dopamine system anticipating within that tunnel. Panoramic vision, such as looking at a horizon while walking, broadens perception. Willink adds that he took a breath before making his call.

8. Suicide among SEALs may involve brain changes
Willink says friends he 'never would have guessed in a million years' took their lives. Widows such as Sarah Wilkinson, and Marcus Capone's wife, described the man at the end as a different person from the one they married, which leads him to suspect brain trauma from repeated blasts, similar to boxers with CTE. Huberman adds that disrupted sleep schedules also raise risk (shift workers die by suicide far more often), and that people with bipolar disorder, especially men, have a 20–30 times higher suicide rate.

EXAMPLES

1. The oil rig training exercise
In the 1990s, as the most junior man in his platoon, Willink waited about 30 seconds for someone to make a call. He took one 12-inch step back and saw everyone, officers included, staring through their sights with about a 20-degree field of view. From his wider view, he called 'hold left, clear right', everyone repeated it, and the clearance succeeded. He's used the technique ever since.

2. Letting a platoon find its way out of an ambush
In a laser-tag training ambush, Willink held his assistant back while 'dead' trainees piled up so the platoon could learn. Finally the assistant crouched beside one man and said 'peel right'. The call spread, and within a minute the unit was out of the kill zone. People thought Willink was a tactical genius, but he says he was just stepping back and looking around.

3. The vehicle graveyard in Ramadi
In 2006, every patrol drove past 75–100 blown-up vehicles, each representing American casualties, before entering the city day after day. Marc Lee, the first SEAL killed in Iraq, rode as the lead turret gunner, the most exposed position, and never asked to rotate out. His usual answer before missions was 'Feeling lucky, sir.' Willink calls combat 'infinitely harder' than SEAL training.

4. Owning a terse reply online
When someone criticized his curt answer to a recruit nervous about boot camp, Willink caught his defensiveness, agreed the critic was right, and posted a fuller answer: read Leadership Strategy and Tactics, and go in expecting an experience worth enjoying, because if you think it will suck, it will.

OTHER RELEVANT

1. Recharge through play and connection

Jiu-jitsu (social connection, sweat, a quiet mind) and surfing restore him, along with family dinners he rarely had while in the Teams. He also gets in his home cold bath for about 5 minutes daily after training, and he once stayed in 7 minutes after a hot long run.

2. Daily drinking is a red flag

Willink says someone who drinks daily during a downward spiral should stop immediately, and that self-medicating with alcohol signals someone likely needs help. Both men mention Veterans Solutions, which takes veterans through psychedelic programs, as a bipartisan mental health effort.

3. Choose some deliberate discomfort

'If you want to be tougher, you've got to do things that require you to be tougher.' Small daily hardships such as cold showers or hard training build capacity. He avoids training on a full stomach and saves his big meal for after the day's physical work, around 6–7 p.m.

The Science of Creativity & How to Enhance Creative Innovation

Date: 2022-12-19 · Duration: 2:16:57
URL: https://www.youtube.com/watch?v=KPlJcD-o-4Q

KEYPOINTS

1. Creativity is a novel combination of existing elements that reveals something fundamental
Novelty alone is not enough: a fish tank with wings is new but tells us nothing. Huberman defines a creative act as one that recombines notes, colors, numbers, movements or ideas in a way that exposes a deeper truth about the world or about how our brains work, often before we can consciously say why. That surprise and sense of truth is accompanied by dopamine release and anticipation of seeing it again.

2. Think of creativity as a verb built from three brain networks
He urges treating creativity as a process. The executive network, centered on the prefrontal cortex, suppresses and eliminates options. The default mode network, engaged when you close your eyes and turn inward, supports spontaneous imagination drawn from memory. The salience network flags what matters.

3. Divergent thinking explores; convergent thinking tests
Divergent thinking spools out possibilities from a starting point, such as a pen becoming a red pen, or a doorstop. Convergent thinking binds several elements into one real-world answer that obeys physical rules, such as wing, water and engine converging on a seaplane. Divergent work needs just enough focus to keep the starting item in mind; convergent work needs persistence and feels harder, like solving a puzzle. Real creativity cycles between the two, usually divergent first.

4. Two separate dopamine pathways drive the two modes
The nigrostriatal pathway, from the substantia nigra to the dorsal striatum, controls body and eye movement and activates even when you merely imagine walking; it underlies divergent thinking. The mesocortical pathway, from the lateral ventral tegmental area to the prefrontal cortex, supports motivation, emotion, focus and persistence, and underlies convergent thinking. The mesolimbic reward pathway and the pituitary-linked tuberoinfundibular pathway are not central to creativity as far as is known.

5. Divergent thinking needs elevated dopamine, but not too much
Work from Chermahini and Hommel in the Netherlands uses blink rate, a noninvasive readout of nigrostriatal dopamine, to link mood and creativity. Moderately elevated dopamine and good mood make divergent thinking easier, but very high dopamine, as in a manic episode or on cocaine or methamphetamine, narrows thought into a single fixated tunnel. Huberman notes that bipolar disorder carries a 20 to 30 times higher suicide rate, so its link with creativity should never be romanticized.

6. Your current mood should determine which tool you reach for
People in a low mood, around 2 to 4 out of 10, rarely do well at divergent thinking but respond readily to uplifting stimuli; people already in a good mood get worse when they add stimulation. Rate yourself, then either boost dopamine first or start creating right away.

7. No pill targets a single dopamine circuit
L-tyrosine, prescription stimulants such as Ritalin, Adderall and modafinil, and illicit drugs raise dopamine across all four pathways; dopamine-blocking antipsychotics lower it everywhere, hence movement side effects such as tardive dyskinesia. Focus-sharpening stimulants appear weighted toward motivation and reward systems, which is why they can be habit-forming and belong under a psychiatrist's close supervision.

8. Stillness can raise dopamine in the very pathway divergent thinking uses
Huberman argues behavioral tools can be more selective than drugs. In a yoga nidra-style deep-relaxation state, readiness to move drops while internal visual imagery rises, expanding the library of options available for recombination.

9. Serotonin also shapes creative thinking, with major legal caveats
Serotonin acting at 5-HT2A receptors supports both modes. He cites a study in which daily, non-hallucinogenic microdoses of psilocybin over several weeks increased divergent thinking, while stressing that psilocybin remains illegal in most places, including most of the US, that most clinical trials study macrodoses, and that serotonergic drugs act broadly, much as SSRIs affect libido and appetite as well as mood.

10. Alcohol and cannabis do not make people more creative in any usable way
There is zero evidence alcohol increases creativity, though very low doses may loosen the self-judging autobiographical narrative by quieting the prefrontal cortex. High-THC cannabis can boost divergent thinking so much that convergent thinking cannot rein it in, so ideas rarely become a coherent product or are forgotten.

EXAMPLES

1. Escher versus Banksy versus an accurate portrait
A faithful portrait is skilled but not creative because it reproduces what is there. Escher repeats birds and staircases at scales the visual system normally filters out. Banksy stencils a dog lifting its leg beside a real fire hydrant, so a familiar cartoon concept pops out of a city surface. Both reveal something about perception.

2. Kjaer and colleagues: 65% more dopamine during yoga nidra
In this Danish brain-imaging study subjects lying still in self-directed deep relaxation showed a 65% increase in dopamine release, specifically in the nigrostriatal pathway, plus more theta activity, a brainwave pattern associated with divergent thinking. Reduced movement was essential. Sessions ran over 60 minutes, though Huberman suggests 10 to 30 minutes of NSDR is likely useful.

3. Huberman's own caffeine split while building this episode

He deliberately abstained from caffeine while imagining how to organize the material, then took caffeine before structuring it according to decisions already made. He reasons caffeine favors focus and persistence, so it suits convergent work more than open-ended exploration. He concedes a podcast outline is not a Banksy-level creative act.

4. Narrative training resolves a paradox about children

The paper A New Method for Training Creativity: Narrative as an Alternative to Divergent Thinking notes that children are more imaginative than adults yet worse at the memory and logic divergent thinking depends on. Tracing narrative theory back to Guilford in the 1950s and Aristotle's Poetics in 335 BCE, it proposes three trainable steps: world building, perspective shifting and action generating.

OTHER RELEVANT

1. Train both modes with a back-to-back meditation

Open monitoring meditation, eyes closed and simply noticing whatever thoughts and feelings surface without judging them, typically 10 to 30 minutes, improves divergent thinking within days to about a week, even without daily practice. Focused attention meditation, repeatedly returning attention to the breath, a body part, a tone or a point on a wall, improves convergent thinking. For creativity, do 5 to 10 minutes of open monitoring followed immediately by 5 to 10 minutes of focused attention, a few times a week or more.

2. Match dopamine boosters and caffeine to the stage of work

If you feel flat, spend about 5 to 30 minutes on music, exercise or inspiring stories before brainstorming; if you already feel good, skip extra stimulation. Save caffeine, at 1 to 3 mg per kg of body weight, for testing and refining. He mentions L-tyrosine at 500 to 1,000 mg and phenylethylamine at about 600 mg, lasting 30 to 45 minutes, as options he and others use, with the warning that people with bipolar disorder or other dopamine-system issues should not do this.

3. Walk, run or pace without inputs to generate ideas

Movement engages the nigrostriatal pathway and the fine, pseudo-random wiring the adult brain keeps, letting ideas from separate mental shelves collide. Huberman gets some of his better ideas on long Sunday runs or hikes with the podcasts off. Dictate ideas into your phone as they surface, but avoid texts and social media, which pull attention back to an external target.

4. Use world, perspective and collision to build a story

Set a bounded rule change for your world, for example cats as curators of the earth. Then adopt another person's underlying motivation rather than just their viewpoint, and force collaboration between characters with clashing motivations to create creative collisions. Keeping the change bounded matters; unbounded change becomes chaos.

Tools for Hormone Optimization in Males | Dr. Kyle Gillett

Guest: Dr. Kyle Gillett
Date: 2022-12-12 · Duration: 2:24:17
URL: https://www.youtube.com/watch?v=O640yAgq5f8

KEYPOINTS

1. Start bloodwork young and retest about every six months
Dr. Kyle Gillett, a physician specializing in hormone optimization, compares a first blood panel to a diagnostic check on a new car. A good time is late puberty (Tanner stages 4 to 5), with parental agreement, or sooner if growth or pubertal timing differs from family patterns. For testosterone, measure total testosterone plus SHBG, or free testosterone. A follow-up around six months is reasonable, interpreted with a physician.

2. Puberty timing shapes height and offers a metabolic reset
Entering and completing puberty early can reduce adult height; once growth plates close on a wrist scan, little more growth occurs. Gillett calls puberty almost a free dose of testosterone and drive, a good window for a child with obesity to change habits. He says the idea that resistance training stunts growth is false.

3. Lifestyle pillars come first
Diet, exercise, sleep, stress and social connection underlie everything. Gillett warns that strict vegan or carnivore diets in the teens and early 20s are likely to lower free androgens, and that cutting dairy during growth can reduce IGF-1. Aim for quality sleep about 80% of nights. Caloric restriction helps testosterone in people carrying excess fat but lowers it in lean people by raising SHBG and reducing building blocks and growth signaling.

4. Vigorous exercise three to four times a week is sustainable
Add three or four lighter sessions, such as Zone 2 cardio or easier lifting that still builds tendon collagen. Regularly training vigorously for more than about an hour is not hormonally helpful. Huberman notes his own bloodwork worsens when he skips a weekly 45-minute jog.

5. Frequency matters for masturbation and pornography
Prolactin released after ejaculation suppresses LH and FSH. Gillett suggests daily or more frequent masturbation could be hormonally detrimental, and pornography likely worse. His 'dopamine wave pool' analogy: very high peaks bring deeper troughs and can drain the pool, similar in physiology to withdrawal from amphetamines.

6. Testosterone therapy rarely makes sense for young men with normal levels
For men in their 20s with levels in the roughly 300 to 900 ng/dL range, Gillett says benefits almost never outweigh risks. When therapy is chosen, a typical physiologic starting dose is about 100 to 120 mg of cypionate or enanthate per week, split into two or three injections. Watch for acne, hair loss, mood changes and effects across organ systems, ideally with an interdisciplinary team. Fertility suppression varies widely between men; hCG can help preserve it.

7. Creatine is fine even if you worry about hair loss
Creatine slightly raises total testosterone and conversion to DHT, but Gillett says it only restores what a man is naturally inclined toward, so hair loss is not a reason to avoid it. Huberman takes 5 g daily. The androgen receptor gene sits on the X chromosome, inherited from the mother, which partly explains the maternal-grandfather baldness link.

8. Supplements that support the steroid pathway
Tongkat ali, 300 to 1,200 mg daily (check eurycomanone standardization), upregulates enzymes in testosterone synthesis, may raise DHEA, lowers SHBG only when it is high, and needs no cycling. Fadogia agrestis raises LH. A rat study suggested about 300 mg a day as a no-toxicity dose; Gillett offers 600 mg every other day without labs, or 600 mg daily for a month then one to two weeks off while monitoring GGT and alkaline phosphatase. Boron, 5 to 12 mg, can acutely lower high SHBG; correcting low vitamin D helps testosterone.

9. Free testosterone around 2% of total is a rule of thumb
The usual range is 1 to 4%. Genetic SHBG variants run low, while varicoceles tend to raise SHBG. Gillett's point: a value off 2% is fine as long as you understand why.

EXAMPLES

1. L-carnitine and betaine
Oral L-carnitine has about 10% bioavailability, so Gillett uses 1 to 5 g; injectable doses by prescription run 500 to 2,000 mg. It shuttles fuel into mitochondria and increases androgen receptor density. High doses can raise TMAO, which allicin from garlic or a healthy gut microbiome may reduce; Huberman takes 600 mg of garlic with his carnitine. Betaine, 1 to 3 g, helps creatine non-responders or persistently high homocysteine.

2. Clomiphene and hCG instead of testosterone
Clomiphene blocks estrogen feedback at the hypothalamus and pituitary, raising testosterone dose-dependently but with other effects. Huberman recalls feeling terrible, with low libido and achy joints, on a low-dose aromatase inhibitor, a reminder that men need estrogen. High-dose hCG can also stimulate the thyroid's TSH receptor.

3. Restoring fertility without drugs
Gillett has seen patients regain sperm simply by stopping daily hot tubs and tight clothing. Huberman cites a paper linking each 2-degree rise in scrotal temperature to roughly a 20% drop in sperm production, with heated car seats a factor.

4. Low-dose tadalafil for the prostate
At 2.5 to 5 mg daily (Gillett suggests no more than 10), tadalafil may support prostate blood flow, increases androgen receptor density and can halve nighttime urination, helping sleep. Higher doses can reversibly affect red-green color vision,

which matters mainly for pilots.

OTHER RELEVANT

1. Limit alcohol and smoked cannabis

Alcohol increases aromatase and suppresses LH and FSH; Gillett suggests no more than three to four standard drinks every two weeks. Smoked THC lowers testosterone, raises prolactin and is associated with breast tissue growth; CBD and edibles appear less disruptive. High-dose nicotine is also a concern.

2. Know your PSA baseline

Expected PSA rises with age, from about 0 to 1 at 20 to 1 to 3 at 40. Finasteride or dutasteride roughly halves PSA, so a stable reading on these drugs can mean it actually doubled.

3. Protect the pelvic floor

Prolonged seated cycling can pressure the perineum. Kegels are only one tool, and excessive contraction may limit blood flow; seek a physical therapist for problems.

4. Reduce BPA exposure

Gillett avoids cans and plastics that may contain BPA, a xenoestrogen, and tests both his filtered and tap water.

Using Caffeine to Optimize Mental & Physical Performance

Date: 2022-12-05 · Duration: 2:22:35
URL: https://www.youtube.com/watch?v=iw97uvIge7c

KEYPOINTS

1. Caffeine acts mainly by blocking adenosine
Adenosine builds up the longer you are awake and drives sleepiness, and sleep clears it. Caffeine occupies adenosine receptors without activating them, so you feel less tired even though adenosine is still there. Huberman describes four main actions: blocking adenosine, raising dopamine and norepinephrine, boosting acetylcholine in the forebrain for flexible thinking, and increasing dopamine receptors in the brain's reward pathways.

2. Caffeine increases dopamine receptors in reward circuits, which is why it reinforces behavior
With more dopamine receptors ('parking spots') available, things that already feel good feel better. That is the evolutionary purpose of caffeine in plants. Huberman cites a study showing bees prefer nectar containing tiny amounts of caffeine, which strengthens their memory and preference for those flowers. Humans are conditioned the same way to the foods, places and activities paired with caffeine.

3. A useful single dose is 1–3 mg per kg of body weight
For a 100 kg (220 lb) person that is 100–300 mg per sitting; for 50 kg (110 lb) it is 50–150 mg. Huberman suggests starting at the low end if you are not a regular user. This is a per-dose figure, not a daily total. Two 200 mg doses an hour apart act like roughly 400 mg and are likely to cause jitters.

4. Being caffeine-adapted is different from tolerance
If caffeine raises your heart rate and makes you a bit anxious at a normal dose, you are probably not adapted. If it leaves you alert but relaxed, you probably are. Huberman counts you as a regular user if you have had caffeine daily for the past two weeks. Taking it two to four times a week makes you an intermittent user.

5. Delaying caffeine 90–120 minutes after waking is meant to prevent the afternoon crash
Huberman's reasoning: the natural morning cortisol rise helps clear leftover adenosine. Caffeine taken immediately only masks adenosine, which then hits once the caffeine wears off. Waiting, ideally after morning light and some movement, means caffeine arrives on top of a higher cortisol peak. A moderate dose then carries you into the afternoon without needing more.

6. Afternoon caffeine degrades deep sleep even if you fall asleep fine
Caffeine's 'quarter life' is about 12 hours: roughly 25% of a noon dose is still active at midnight. Huberman says that for about 95% of people, afternoon caffeine reduces slow-wave sleep, which then disrupts REM sleep and next-day emotional processing. Slow-wave sleep is also tied to growth hormone release and immune function. He recommends avoiding caffeine for 12 hours before bed, or at least 8–10.

7. Caffeine reliably improves mental and physical performance
Alertness rises within about five minutes on an empty stomach and peaks around 30 minutes. Improvements in reaction time, mood, focus, recall, dexterity, power and endurance are seen with 1–3 mg/kg taken beforehand. A 2020 European Journal of Nutrition study found caffeine boosted peak aerobic cycling power regardless of menstrual cycle phase.

8. Some of caffeine's 'boost' in regular users is relief from withdrawal
Habitual users who skip their usual dose perform worse, which inflates the apparent benefit when they take it. To maximize the effect, Huberman suggests taking caffeine on an empty stomach or abstaining for two to three days beforehand. A study he cites used a five-day abstinence and found cortisol responses to caffeine were reduced but not eliminated in daily users.

9. Several common fears about caffeine aren't supported
Large studies indicate caffeine does not cause or worsen osteoporosis as long as dietary calcium is adequate. At 1–3 mg/kg, or even double that, there are no consistent effects on testosterone or estrogen in men or women. Huberman cautions that about 90% of adults use caffeine, so good control groups are hard to find. Moderate intake is linked to lower depression risk and some protection against Parkinson's and possibly Alzheimer's, though these are associations.

EXAMPLES

1. Yerba maté and GLP-1
Yerba maté stimulates release of GLP-1, a satiety peptide first studied in Gila monsters, and may help blunt appetite. Huberman advises avoiding smoked varieties, which may be carcinogenic.

2. Theanine to take the edge off
Theanine, a nonprotein amino acid found in green tea, competes with excitatory glutamate signaling. Huberman cites 200–400 mg to offset caffeine jitters, with studies suggesting up to 900 mg/day is safe. One study found 17 days of 200–400 mg, one to three times daily, reduced depression and anxiety. He advises people prone to vivid dreams, night terrors or sleepwalking to avoid it at night.

3. Adrenaline after learning boosts memory
James McGaugh's review describes a medieval practice of throwing children into cold water after they witnessed something important, which made them remember it better. Lab studies confirm that spiking catecholamines after learning enhances memory. Huberman suggests caffeine, exercise or deliberate cold right after a learning session can work the same way.

4. Why Huberman doesn't endorse the 'nappuccino'
Drinking coffee right before a nap pushes caffeine into the afternoon. Caffeine also undermines the restorative effects of naps under 90 minutes and of NSDR, which on its own has been shown to raise dopamine.

5. Sugar paired with caffeine

Because caffeine reinforces whatever it accompanies, sweetened caffeinated drinks or coffee with dessert can strengthen sugar cravings. Separating the two can make cravings easier to break.

OTHER RELEVANT

1. Dose by body weight and per sitting

Calculate 1–3 mg/kg, start low if you're sensitive or new, and remember that closely spaced doses add up.

2. Exceptions to the morning delay

If you train hard soon after waking, take caffeine before the workout, but expect a bigger afternoon dip. To move to a later first dose, push it back about 15 minutes per day, or split it: half on waking and half an hour later.

3. Use caffeine to make exercise more rewarding

Caffeine before training, combined with the dopamine from exercise, gives a longer-lasting lift and makes exercise more reinforcing.

4. Replace fluid and a little sodium

Caffeine is a diuretic that also drives sodium loss. Huberman suggests hydrating with a small amount of sodium or electrolytes to sustain alertness, while staying mindful of blood pressure.

5. Protect sleep first

An occasional afternoon coffee won't ruin you, but making late caffeine a habit erodes deep sleep and leads to more caffeine the next day.

Navigating Conflict, Finding Purpose & Maintaining Drive | Dr Lex Fridman

Guest: Dr. Lex Fridman
Date: 2022-11-28 · Duration: 2:41:46
URL: https://www.youtube.com/watch?v=6I5I56uVvLw

KEYPOINTS

1. War creates generational hate, not just casualties
Back from weeks in wartime Ukraine, Fridman — whose family is half Ukrainian, half Russian — said war's most painful lesson is its secondary effect. People who lose a parent or child come to hate not only the invading leaders or soldiers but an entire people, tearing apart a shared history such as the Russian and Ukrainian alliance in World War II. That 'generalization of hate' lasts for decades.

2. Seeing a country at war deepened his appreciation for ordinary stability
He came back grateful for what Americans take for granted: easy access to food, a reliable rule of law, relatively little corruption, a fair shot at building a business, and homes that stay in a family across generations. War destroys photographs, records and life stories along with buildings.

3. Intensity of life made creature comforts disappear
Fridman, who says he hates travel and loves ritual, stayed in towns under blackout, navigating hotels by phone light — Huberman joked about the circadian cost. Curfews of 9–11 p.m. sent everyone home, eating was often once a day, and he found the forced solitude to think valuable. He said the love people showed each other outweighed the lost comforts.

4. Ukraine's wartime unity was driven by love of country, not hate
Nearly everyone — scientists, engineers, CEOs, professors, actors — wanted to fight, some learning weapons from YouTube videos. That drew psychological as well as financial resources away from science. Early in the war, guns were handed out widely and some prisoners released for lack of staff, yet crime dropped to near zero, by Fridman's account. He credits Zelensky, who had only about 30% approval before the war, for staying in Kyiv against advice to flee.

5. Humans habituate to violence alarmingly fast
Fridman noted that a peaceful society is shocked by a first 9/11-style explosion, but people soon adapt to repeated violence. Huberman contrasted a 'no firearms' sticker on a Texas school with a 'no peanuts' sticker at a Bay Area elementary school to show how much a sense of danger depends on familiarity.

6. Love-driven work is sustainable; adversary-driven work is catabolic
Asked about motivation, Fridman described a negative inner voice ('too weak, too dumb, too old') that some people fight against. Huberman recalled postdoc-era competition with prominent labs that made him work extra hours but felt 'catabolic'. He contrasted it with curiosity-driven work on the podcast and in his stress and performance lab, which has hard days but no adversary.

7. A calling feels like falling in love, not a compulsion
Huberman offered the job-career-calling distinction and asked whether Fridman's urge to start a robotics company was a calling or an irritating compulsion. Fridman said it's one he hopes never goes away: seeing 'magic' in robots, like noticing someone walk into a room and wondering whether anyone else sees it. He expects very low points if he starts it.

8. Walk the middle with empathy and humility
Fridman believes the extremes define today's divisions while most people sit in the middle, uncertain. He said a good conversation with Donald Trump would require steelmanning his worldview and empathizing with the large share of the country that supports him. He still gets hate for interviewing Pfizer's CEO. He trusts individual scientists but warns that institutions of good people can still go off track.

9. In your 20s, pick one thing and work harder than you've ever worked
His advice from a recent MIT lecture: ignore 'work-life balance' early, find one passion and give it everything, 'and if it destroys you, it destroys you'. He caveats that this fits grind-rewarding fields like programming (think John Carmack) better than ones where clarity of ideas matters more than hours. He thinks successful people forget that they learned balance the hard way.

EXAMPLES

1. The brown belt was the hardest
Fridman trained Brazilian jiu-jitsu twice a day for seven or eight years. At the Worlds, blue and purple belt divisions had about 140 competitors, requiring seven to nine straight wins to medal, against shredded 23–25-year-olds training three or four times a day. His black belt felt ceremonial by comparison.

2. Why the black suit and tie
In tech and academia people dressed casually, and Google staff 'in pajamas'. Fridman wanted to take every moment seriously, inspired partly by Richard Feynman's mix of class, humor and brilliance. Overdressing slightly signals respect for guests and audience.

3. Cold exposure and testosterone
Huberman said a few decent papers link cold exposure to higher testosterone, likely via vasoconstriction followed by rebound blood flow to the testes (and probably reproductive organs in women) on rewarming, rather than the cold itself.

4. An AI equivalent of psychedelics?
Fridman pointed to diffusion models like DALL-E and Stable Diffusion: injecting a little noise into a system with deep visual representations yields novel art. He said he doesn't know exactly how psychedelics work, but randomness does a lot of work

in machine learning.

OTHER RELEVANT

1. Build relationships through hard times

Fridman's view, which made Huberman laugh, is that starting a relationship at a low point can make it stronger, because bonds tested early in hardship hold up.

2. Check what fuels your effort

Notice whether you're running on spite or competition, which can work briefly but drains you, or on curiosity and love, which last.

3. Treat in-person teaching and humility as assets

Fridman found lecturing to a live MIT crowd after the pandemic 'magic'. Both agreed that an instructor who feels undeserving teaches better than an entitled one.

Science-Based Tools for Increasing Happiness

Date: 2022-11-14 · Duration: 2:23:44
URL: https://www.youtube.com/watch?v=LTGGyQS1fZE

KEYPOINTS

1. There is no single happiness molecule
Chronically low dopamine, as in drug withdrawal or Parkinson's, tracks with low mood, and very high dopamine, as in bipolar mania, with inappropriate euphoria. Most people sit on a continuum between, and levels of dopamine and the other catecholamines probably correlate with mood and a sense of possibility. But no recipe of neuromodulators equals happiness. Huberman notes that the serotonin hypothesis of depression has been called into question, since depressed people can have normal serotonin, yet SSRIs still help many people and remain excellent treatments for conditions such as OCD.

2. Money cannot buy happiness, but it can buffer stress
The Harvard study that began in 1938 with Harvard sophomores, and shorter studies, find happiness does not scale with income past a certain level relative to cost of living. Huberman stresses the other side: income that covers living costs plus a buffer reduces anxiety, buys services such as childcare or a night nurse, and opens access to social life. He points to the common advice, where possible, of savings covering 2 to 12 months of expenses, depending on how anxious you are about losing a job.

3. Work and meaning matter more than the deathbed cliché suggests
Total hours worked do not predict happiness, yet work provides income, resources and often deep meaning. Huberman calls it naive to treat work as opposed to happiness, especially when it funds social connection, health care and recreation.

4. Happiness across life is roughly U-shaped
People report high happiness in their 20s, a dip through the responsibility-heavy 30s and 40s, and a rise in the 50s and 60s. People who choose not to have children report being at least as happy, or happier, than parents, even though most parents call their kids their greatest joy. Possible reasons such as more sleep, money or time are untested; Huberman is not advising anyone against children.

5. Birthdays tend to lower happiness
From about age 25, people report lower mood on their birthdays, apparently because the date prompts comparison with age-matched peers and unmet milestones. Huberman takes this as evidence that happiness is largely relative and that we are poor at locating ourselves on the long arc of life.

6. Smoking and heavy drinking are strongly anti-correlated with happiness
The Harvard project links chronic smoking and alcoholism with lower happiness, and partners and family of chronic smokers and drinkers also report lower happiness. Huberman adds that more than about two drinks per week is detrimental to various aspects of health.

7. Trauma can lastingly reduce happiness; the lottery-paraplegic claim is wrong
It is often said happiness returns to baseline 3 to 12 months after a trauma. Huberman pushes back, using Paul Conti's definition of trauma as something that changes brain and body function in ways that make daily life harder. Dan Gilbert's famous talk said lottery winners and new paraplegics are equally happy a year later, but in a 2019 podcast Gilbert corrected himself: the difference is smaller than expected, not zero.

8. Synthetic happiness is real and takes effort
Natural happiness comes from getting things; synthetic, or self-directed, happiness is created through what we do and how we attend, and research from Gilbert and others suggests it is at least as powerful. It relates to the hedonic set point and to dopamine dynamics in which anticipation often releases more feel-good chemistry than acquisition. Getting rewards without effort can blunt the dopamine system. Gillian Mandich's work shows synthetic happiness also depends on environment, including music, alongside effort such as happiness inventories.

9. Committing to a choice makes you happier with it
In Gilbert's experiments, people ranked paintings or chose which of their photos to keep. Those whose choice was final were more satisfied than those who could swap later. Freedom of choice itself correlates with happiness; the cost comes from keeping options open after deciding.

EXAMPLES

1. Elizabeth Dunn: 'Spending Money on Others Promotes Happiness'
This 2008 Science paper found income has a reliable but surprisingly weak effect on happiness once basic needs are met. Prosocial spending predicted greater happiness independently of income and with similar magnitude, while personal spending did not. Employees who gave away more of a bonus were happier, and how they spent it mattered more than its size. Benefits grow when the giver knows the help landed.

2. Killingsworth and Gilbert: 'A Wandering Mind Is an Unhappy Mind'
Sampling 2,250 adults during daily life, the 2010 Science study found mind-wandering predicted lower happiness regardless of activity. Minds wandered to pleasant topics 43% of the time, unpleasant 27% and neutral 31%, yet people were no happier thinking pleasant thoughts than focusing on their current task. The authors concluded mind-wandering is generally a cause, not merely a consequence, of unhappiness.

3. Eye contact rises and falls in good conversation
A 2021 PNAS paper tracking gaze and pupil size found mutual eye contact signals that both people will soon look away. It suggests good conversation requires moving in and out of shared attention rather than constant eye contact.

4. Brief contact with an unfamiliar dog

A 2018 Yale paper on children found brief, unstructured interaction with an unknown dog after a moderate stressor raised positive affect more than receiving a soothing object or waiting. Before he could own a dog, Huberman walked foster and neighbors' dogs for free on Sundays.

5. The janitors at dawn

Living largely in the lab as a graduate student, Huberman found brief daily exchanges with night janitors deeply meaningful and missed them over holidays. He links this to the fusiform face area, studied by Nancy Kanwisher at MIT: seeing familiar faces, especially in morning and late afternoon, supports emotional well-being.

OTHER RELEVANT

1. Reverse most people's lighting pattern

Get sunlight within the first hour of waking for 5 to 20 minutes depending on cloud cover. Keep indoor lights very bright during the day, dim them from about 6 to 8 PM, and avoid bright light from 10 PM to 4 AM, which can impair dopamine circuits and mood. Viewing sunlight outdoors, not through glass, for 2 to 10 minutes in late afternoon or near sunset reduces the retina's sensitivity to evening artificial light.

2. Train focus to raise both kinds of happiness

Because presence predicts happiness even in dull tasks, Huberman sees focus as the biggest lever. He suggests a 5 to 13 minute daily meditation, really a focusing exercise, plus good sleep, which underlies daytime attention.

3. Give money, time or effort where it registers

Give whatever share you can afford, or volunteer time: food kitchens, community gardening, helping a neighbor with childcare. Seek feedback that it helped.

4. Design a cheerful environment and value small connections

Shape your space with plants, music, silence or headphones. Huberman uses freshwater aquariums, Glenn Gould, whale song and 40 Hz binaural beats. Count brief, predictable interactions, and value non-sexual touch, which he calls allogrooming, and time with animals.

LIVE EVENT Q&A: Dr. Andrew Huberman Question & Answer in Los Angeles, CA

Date: 2022-11-09 · Duration: 1:03:37
URL: https://www.youtube.com/watch?v=TO0WUTq5zYI

KEYPOINTS

1. ADHD involves a higher threshold for engaging dopamine, not an inability to focus

Huberman, who stresses that he isn't a clinician, notes that children and adults with ADHD can focus intensely on what they enjoy, such as a favorite video game. He doesn't tell anyone to stop prescribed Vyvanse, Adderall or Ritalin. His order is behavior first, with sleep and nutrition as prerequisites, then supplements such as L-tyrosine (a dopamine precursor, to be approached carefully), then prescription medication.

2. Mental focus follows visual focus

He describes visual focus exercises used in schools in China, now being studied elsewhere: hold your gaze on a target for 1 to 3 minutes, blinking as needed. He also cites Wendy Suzuki's NYU work showing that about 13 minutes a day of breath-focused meditation improved focus significantly, though few people stick with it. Focusing always involves refocusing.

3. Space-time bridging is a perceptual exercise, not mysticism

With eyes closed, place your attention just behind your forehead. The brain has no sensory neurons there, so you're attending only to thought. Then, keeping some attention on your breathing, focus at about hand's distance, then farther and farther, until you picture yourself as a speck in a vast landscape. Near focus slices time finely, while far, panoramic focus changes time perception and tends to calm. Huberman says people under stress, or with attention problems, tend to get stuck at or jump between these distances. His team is still collecting data on it.

4. Under high stress, the body starts leading the thinking brain

Citing his colleague David Spiegel, Huberman explains that normally the prefrontal cortex leads the insula and other areas that track internal sensations. Past a certain level of stress that relationship flips, and creativity and options shrink. In his analogy, the coach starts getting dragged by the players. Confidence comes from learning to modulate stress in real time and raising your stress threshold.

5. The dopamine system responds to how you interpret events

You have one reward system for money, mates, food and work, and it is highly contextual. Honestly reframing a failure as a win in some real sense can produce an internal chemical win that sets up real ones. He points to Nelson Mandela and Viktor Frankl, who found what they could control while imprisoned.

6. EMDR pairs a calm state with recalling trauma

EMDR is one of four approved behavioral treatments for trauma, and Huberman says it works best for single-event trauma. Side-to-side eye movements, which also happen naturally when walking without fixing on a target, strongly reduce amygdala activity. Pairing that calm with recounting the trauma is a form of reverse conditioning, and some researchers think it may involve clinical hypnosis. He predicts combination therapies, possibly with drugs that boost plasticity, rather than one-or-the-other choices.

7. Separate what modulates health from what mediates it

A physiological sigh directly mediates calming. Sleep, sunlight, exercise, nutrition, social connection and a healthy gut microbiome modulate many systems. Fixing a disrupted microbiome won't cure depression, but it can lift mood, because gut bacteria produce chemicals that become serotonin or dopamine in the brain. He recommends low-sugar fermented foods such as natto, kimchi, sauerkraut, kombucha and some yogurts.

8. Sustained motivation runs better on delight than on grit

Working from anger, fear or competitiveness works but depletes you and requires long recovery. A more renewable fuel comes from the dopamine and serotonin of genuinely loving what you do. In college, faced with a subject he hated, Huberman would try to fall in love with it by finding the gems in it. Sometimes it worked.

EXAMPLES

1. How long to stay in the cold

Asked whether to wait for adrenaline to rise and fall before getting out, Huberman says yes, if it's safe. Get to the "I really want out, but I can stay safely" point and leave after you've accomplished something, not in panic. He cites a European Journal of Applied Physiology paper showing a 100 to 200% dopamine increase lasting hours, a slow rise that he says doesn't crash. He finishes with a warm shower.

2. Cooling the palms

Hands, the soles of the feet and the upper face have vascular shortcuts that let the core cool faster. Craig Heller's Stanford work shows that cooling the hands between sets or during endurance work can greatly extend performance; Huberman says it can double sets or endurance. A cold, not ice-numbing, container of water works; you don't need a device.

3. Choosing Costello

Huberman picked the puppy that was eating out of its siblings' bowls and then napped instead of barking when separated. He wanted a calm, parasympathetic-dominant dog to steady his own nervous system. He contrasts bulldogs with whippets and Italian greyhounds, and agrees that a stressed horse's double-inhale sighs reflect the same stress-regulating mechanism.

4. Psilocybin: single large doses look promising, microdosing less so

Citing Matthew Johnson, Huberman says microdosing data are thin, while guided single high-dose sessions for depression, some PTSD, eating disorders and end-of-life distress are encouraging, with about two-thirds of people getting lasting relief in

current data. He notes Nolan Williams's point that psilocybin ranks near the bottom of perceived individual and societal risk. It isn't for people with psychosis, it's still illegal in most places, and guides help steer people away from distractions in the experience.

5. Why the sauna kills appetite

Huberman speculates that uncomfortable heat releases dynorphin, which suppresses appetite and later upregulates mu-opioid receptors. He adds that infrequent sauna use (once a week, four 20-minute sessions with 5-minute breaks) produced large growth-hormone increases in studies, with smaller increases when done more often.

OTHER RELEVANT

1. Advice for a 15-year-old

Get lots of sleep, and develop a keen awareness of what stresses you, relaxes you and delights you, as antennae for later choices. Huberman suggests this rather than prescribing a formal meditation practice, given how plastic the teenage brain is.

2. Find your seed of delight

Drawing on Robert Greene, recall what fascinated you before puberty. For Huberman it was cataloging tropical fish at a Palo Alto pet shop, which he says was really about organizing and predicting. Notice the physical pull of real interest. You find it through action and new people, not by waiting on a mountaintop. He cites Nobel chemist Carolyn Bertozzi, who stayed home in college to read organic chemistry.

3. Micro-slice what intimidates you

Huberman credits a friend's frame: you're back on your heels, flat-footed, or leaning forward. The aim is just getting from heels to flat feet, using calming tools so more internal resources stay available.

The Science of Eating for Health, Fat Loss & Lean Muscle | Dr. Layne Norton

Guest: Dr. Layne Norton
Date: 2022-11-07 · Duration: 3:49:34
URL: https://www.youtube.com/watch?v=K4Ze-Sp6aUE

KEYPOINTS

1. Energy balance governs weight, but intake is harder to measure than people think
Norton calls a calorie a unit of measurement: 'not all calories are created equal' is like saying not all seconds are equal. Sources still differ in how much usable energy they yield. Food labels can be off by up to 20%. Fiber lowers metabolizable energy, and gut microbes vary in how much energy they extract from it. Protein rarely ends up stored as fat, but surplus protein still adds calories and can let other nutrients be stored.

2. NEAT is the big, variable piece of expenditure
Non-exercise activity thermogenesis (fidgeting, pacing, spontaneous movement) varies enormously between people. As weight drops by 10%, NEAT has been seen to fall by almost 500 calories a day. Basal metabolic rate also declines, partly because the body is smaller and partly from metabolic adaptation, which Norton says averages around 15% and newer evidence suggests happens mostly in the first weeks of a diet.

3. Fitness trackers badly overestimate burn
Norton cites a 2018 meta-analysis finding wearables overestimate energy expenditure by about 28–93%. He suggests using them for relative comparisons, such as whether today was more active than yesterday, rather than eating back 'burned' calories.

4. Exercise is better at weight regulation than its calorie count suggests
Exercise alone often looks weak for weight loss on paper. Norton notes that in controlled trials, people who start exercising tend, on average, to eat less, and active people seem to match appetite to needs better than sedentary people, though some report feeling hungrier. Beliefs matter: in one study, lifters falsely told they were on anabolic steroids made greater strength and lean-mass gains than those not told.

5. Diet type matters less than adherence
When calories and protein are equated, meta-analyses find little difference in fat loss or most health markers between time-restricted eating and normal schedules, or between low-carb and low-fat diets. Norton cites Kevin Hall's 2017 analysis of 22 studies in which all food was provided, which ensured high adherence. His advice is to pick the plan you can sustain, ideally indefinitely. Huberman adds, 'pick your placebo too.' Lasting change often requires an identity shift, and Norton quotes a client who said he had to 'kill my clone.'

6. Protein: about 1.6 g/kg captures most muscle benefit
Benefits plateau around 1.6 g per kg of body weight, with possible small gains up to 2.4–2.8 g/kg on a curve that flattens. A one-year trial found no negative health outcomes up to about 4 g/kg. Participants simply felt so full they ate fewer calories. Norton dismisses fears that stimulating mTOR shortens life. Any macronutrient in isolation can be made to look harmful mechanistically, much as exercise acutely raises blood pressure and inflammation yet improves health.

7. Fasting doesn't boost protein uptake but rarely costs muscle
Studies don't show that a fast lets you assimilate more protein afterward. Typical time-restricted eating doesn't reduce lean mass compared with eating freely. Some extreme protocols like alternate-day fasting show lean-mass differences. Norton stresses you can still build muscle that way, just perhaps less.

8. Fiber is 'the longevity hack'
A meta-analysis of over a million people found every additional 10 g of daily fiber was linked to about a 10% lower mortality risk, including cardiovascular disease and cancer. Norton urges diverse sources (fruit, vegetables, whole grains), notes fiber feeds gut microbes better than probiotics can establish them, and asks fasting enthusiasts whether they're even eating 50–60 g a day. Two cups (about 200 g) of broccoli provide only 5–6 g.

9. Sugar is mostly a fiber and calorie problem
Norton once believed sugar itself was harmful. Calorie-matched trials changed his mind. In Surwit's 1997 study, people on an 1,100-calorie diet ate either about 110 g or about 10 g of sugar daily for six weeks with all meals provided, and both groups lost the same body fat with similar biomarkers. The low-sugar group had a slightly greater LDL improvement, which Norton attributes to more fiber. Fruit sugar isn't linked to the poor outcomes of sugary foods because it comes with fiber.

EXAMPLES

1. Levine's 1995 overfeeding study
In a metabolic ward, volunteers overate by about 1,000 calories a day for six weeks. One person predicted to gain 3–4 kg gained just over half a kilo because he spontaneously increased his physical activity. Norton likens this to a lean natural bodybuilder who would start sweating and fidgeting after meals.

2. Artificial sweeteners versus water
In randomized trials, replacing sugary drinks with non-nutritively sweetened ones helped people with obesity more than switching to water, possibly because the jump to water is too big. Norton says aspartame consistently shows no effect on blood sugar or insulin and stevia little effect. He calls saccharin and sucralose mixed. He criticizes a sucralose study that paired sucralose with maltodextrin against sucrose, and notes possible placebo effects among volunteers who had painstakingly avoided sweeteners.

3. Seed oils and saturated fat

Norton argues that seed oils hurt health mainly by adding calories over the past 20–30 years, not when they replace other fats one-for-one. Saturated fat as a group raises LDL, though stearic acid doesn't, and he suggests keeping it to about 7–10% of daily calories. Over time, accumulating trials persuaded him that LDL is causal in cardiovascular disease.

4. Glucose 'scavengers'

Huberman gets headaches from berberine unless he has eaten plenty of carbohydrate. Norton calls berberine, metformin and white kidney bean 'carb blockers' majoring in the minors. They act like dimmer switches, modestly reducing carbohydrate absorption, not on/off switches.

OTHER RELEVANT

1. Weigh daily, judge weekly

Weigh after waking and using the bathroom, average the week, and compare week to week. Day-to-day swings of 5–6 pounds are normal noise.

2. Prioritize protein and fiber

Aim for about 1.6 g/kg of protein and work toward 30–60 g of fiber from varied foods. Both improve satiety and make minimally processed eating easier. Norton says eating 4,000 calories from minimally processed foods would be miserable.

3. If you supplement, start with creatine monohydrate

With thousands of studies behind it, monohydrate saturates muscle phosphocreatine and supports performance, recovery, lean mass and possibly cognition. Huberman takes 5 g a day. Norton says hydrochloride costs more without clear benefit and ethyl ester is worse. Kidney and liver concerns have been debunked.

4. Watch for 'healthy' processed swaps

Keto cookies and ice creams can contain more calories than the originals. Processed foods aren't toxic per se. The issue is that they make overeating easy.

The Science of Learning & Speaking Languages | Dr. Eddie Chang

Guest: Dr. Eddie Chang
Date: 2022-10-24 · Duration: 2:34:24
URL: https://www.youtube.com/watch?v=Z7MU6zrAXsM

KEYPOINTS

1. The sounds of early life shape the hearing brain
As a medical student working with Mike Merzenich at UCSF, Chang raised rat pups in continuous, moderate white noise that masked natural sounds. The critical period of the auditory cortex stayed open months longer than normal. That sounds like a benefit, but it actually meant delayed maturation. Humans have a similar window: within a couple of years, infants lose sensitivity to speech sounds outside their native language.

2. White noise machines for babies are an open question
Asked whether white noise harms infants' hearing development, Chang says the studies haven't been done. He has used soothing tools himself with three kids. His caution is that continuous white noise doesn't occur in nature, and the developing brain seems to need structured, meaningful sounds.

3. Electrical stimulation of brain areas can switch anxiety on or off
During awake brain mapping, stimulating the orbitofrontal cortex reduced stress, but only in patients who were already anxious. Stimulating the amygdala could cause sudden anxiety, and stimulating the insula could cause disgust. Chang suspects some psychiatric conditions reflect imbalances in electrical activity across these areas.

4. Epilepsy often resists medication
About a third of people with epilepsy (defined here as three or more seizures) aren't controlled by modern drugs. If two or three medications have failed, a fourth or fifth rarely helps. A subset can benefit from surgery to remove the seizure source or from implanted stimulators.

5. The textbook map of language areas is partly wrong
The textbooks still assign speaking to Broca's area (based on Broca's 19th-century patient 'Tan') and understanding to Wernicke's area in the left temporal lobe. In hundreds of patients, Chang's team found that surgery on the posterior frontal lobe often leaves speech intact. The speech-motor areas of the precentral gyrus, which control the lips, jaw and larynx, matter more for producing words. He estimates that about 50% of what's taught about the brain is accurate and the rest oversimplified.

6. Which side of the brain handles language depends partly on handedness
In right-handed people, language is on the left side 99% of the time. In left-handed people it's about 70%, with 20–30% using both sides or the right. After a left-sided stroke, nearby tissue or even the right hemisphere can take over. Chang thinks both sides have the machinery but the brain specializes one.

7. Speech cortex has a 'salt-and-pepper' map of sound features
Recording directly from the brain surface at millimeter and millisecond resolution, his lab finds sites tuned to features such as plosives (b, d, g, made by closing and releasing the mouth) and fricatives (sh, th, made by air turbulence). These sites are scattered rather than laid out in an orderly map. Speech may also reach the speech cortex by its own route, bypassing the primary auditory cortex, which is ordered by frequency.

8. About a dozen movements build every word
Speech production comes down to roughly 12 movement features of the tongue, jaw, lips and larynx. Each is meaningless alone, but combined in sequence they generate every word, which Chang compares to DNA's four bases encoding life.

9. Reading is borrowed from older brain systems
Writing is too recent to have evolved its own brain area. Instead, a visual word form area at the back of the temporal lobe is recruited and linked to the speech-sound system. Many cases of dyslexia stem from weak phonological awareness, a mismatch between seen words and their sounds, rather than purely a visual problem.

10. Bilingual speakers use overlapping circuits
In Chang's ongoing lab study, the same speech areas respond to both languages, and the 'English' cortex even tries to parse an unfamiliar language. What differs is the stored memory of sound sequences that make up each language's words.

EXAMPLES

1. Anxiety that turned out to be seizures
A young woman was treated for anxiety disorder for years. The clue was that her panic attacks came out of nowhere, with no trigger. Her MRI was normal, and only electrodes placed in the brain proved the attacks came from seizures in her amygdala. She needed awake surgery. Chang stresses that the vast majority of anxiety is not caused by seizures.

2. Pancho and the BRAVO trial
The first participant was a man who'd had a brainstem stroke around age 20, days after a car accident, and had not spoken for 15 years. Electrodes over his speech-motor cortex were connected through a port in his skull. After weeks of training the decoder, he produced sentences from a 50-word vocabulary, helped by an autocorrect-style language model. When he giggled with excitement, it disrupted decoding of the next word.

3. Foreign accent syndrome is real; sudden fluency in a new language is not
Chang has never seen or read of a stroke unlocking a language someone didn't know. He has seen foreign accent syndrome, where damage to vocal-tract control areas makes someone sound as if they have a foreign accent.

4. Decoding speech, then faces

About six years before this conversation, his team could decode every English consonant and vowel from epilepsy patients' brain recordings. The next goal is an animated avatar that conveys a paralyzed person's facial expressions along with text.

OTHER RELEVANT

1. Watch for anxiety that has no trigger

Panic that strikes with no trigger, especially if it doesn't respond to treatment, is worth raising with a neurologist. Seizures may only show up on electrodes, not on an MRI.

2. Stuttering is a coordination problem, often made worse by anxiety

Language is intact, but the precise coordination of the larynx, lips and jaw breaks down at times. Anxiety triggers or worsens stuttering but isn't the cause. Speech therapy helps with starting words, and changing how people hear their own voice can alter stuttering for better or worse.

3. Chang's way of staying calm under pressure

He exercises (running, swimming) mainly for his mind and notices the effect within a day or two of skipping it. He leaves his phone outside the operating room and prefers silence there, treating surgery's routine moments as a focused refuge from outside worries.

Psychedelics & Neurostimulation for Brain Rewiring | Dr. Nolan Williams

Guest: Dr. Nolan Williams
Date: 2022-10-10 · Duration: 2:48:55
URL: https://www.youtube.com/watch?v=X4QE6t-MkYE

KEYPOINTS

1. Depression is an umbrella, and among the most disabling conditions worldwide
Williams, a Stanford psychiatrist also trained in neurology, says depression ranges from anxious and overactive to flat and unmotivated. His lab works with Conor Liston's group at Cornell to define biotypes from brain imaging. He compares moderate depression to the disability of an acute heart attack and severe depression to that of untreated, terminal cancer. The American Heart Association now lists depression as a fourth major risk factor for coronary artery disease.

2. Psychiatry has fewer tools as a case gets more acute
In cardiology, an emergency room or ICU offers more tests and treatments than a clinic. In psychiatry, someone who moves from depressed to suicidal often gets the same oral antidepressants they were already taking. Williams' work targets this emergency gap.

3. The prefrontal cortex is wired to the heart
TMS uses a magnetic pulse to induce current in brain tissue only. Stimulating the left dorsolateral prefrontal cortex (DLPFC) spreads through the cingulate, insula and amygdala to the nucleus tractus solitarius and the vagus nerve, briefly slowing the heart. Williams stresses that the slowing marks that you have hit the right network; it is not itself the treatment. Simply lowering heart rate, for instance with a beta blocker, is unlikely to treat depression.

4. There is a 'volitional threshold' in depression
In mild depression, small but well-designed studies support meditation, mindfulness and exercise, and low heart-rate variability is associated with moderate to severe depression. As depression deepens, thoughts become only partly under voluntary control, so behavioral tools work less well. The extreme end is catatonia.

5. Ketamine's antidepressant effect appears to need the opioid system
In Williams' crossover trial, the same patients received standard ketamine with either 50 mg naltrexone or a placebo. Naltrexone largely blocked the antidepressant effect, yet the dissociative 'trip' felt identical. He takes this to mean that pharmacology, not just the subjective experience, matters. He notes that opioids may relieve emotional pain short term but are pro-depressant chronically.

6. MDMA's neurotoxicity reputation rests partly on a mistake
Huberman recounts that an influential Science paper reporting serotonin-neuron damage had in fact injected methamphetamine, as the same group later acknowledged. Williams cites a NIDA-funded study of MDMA-only users in Utah's LDS community that found no neurocognitive differences, plus pre/post testing from early MDMA trials. He concludes there is no apparent risk at one to three clinical doses, with purity assured. Huberman adds that the post-MDMA slump may reflect a prolactin rebound after the dopamine surge.

7. Psilocybin and targeted TMS converge on one circuit
Imaging by David Nutt and Robin Carhart-Harris found overall brain activity decreases on psychedelics while global connectivity increases. Williams says the antidepressant effect of psilocybin, like his TMS protocol, reduces connectivity between the subgenual anterior cingulate (negative mood) and the default mode network (self-representation).

8. Ibogaine produces a 'life review', with cardiac risk
Ibogaine comes from the root bark of an iboga shrub used sacramentally by the Bwiti in Gabon. It produces few open-eye visuals; with eyes closed, people replay past memories with detached empathy, sometimes for 24–36 hours. Williams calls it seemingly the most powerful psychedelic, but also the riskiest, because of cardiac effects his team screened for with ECGs. It is not recreational.

9. Stanford Neuromodulation Therapy (SNT) applies spaced learning to TMS
Standard TMS runs once daily for six weeks. SNT gives 10 sessions a day, an hour apart, for five days: about 90 minutes of total stimulation, roughly five times the usual dose. It uses theta-burst pulses that mimic hippocampal rhythms and are aimed via each person's own connectivity scan. Williams reports remission in 60–90% of cases depending on the study, often within days, though durability varies (some patients a year, some four).

EXAMPLES

1. Veterans' ibogaine study
With donor funding, Williams' group evaluated former SEALs and Army Rangers before and after ibogaine in Mexico, then 5-MeO-DMT a month later as a separate session. They used clinical scales, cognitive testing, imaging and EEG. Early impressions were of dramatic improvement and no cardiac events. Many described forgiving themselves for moral injury.

2. Opioids, depression and pain
In matched knee-replacement patients, those with depression needed about triple the oral opioid dose by day four. Williams suggests the drugs may be treating emotional as well as physical pain.

3. Triple chronotherapy
One night of sleep deprivation lifts mood in depressed people until they sleep again. Work with Stanford colleague Greg Sullivan pairs sleep deprivation with a calculated phase shift and bright light to re-entrain the circadian clock, producing durable effects. Williams warns it increases anxiety and must only be done under medical supervision. He says it is underused partly because it has no billing code.

4. Origins of TMS for depression

His mentor Mark George combined findings of an underactive prefrontal cortex in depression with evidence that TMS could raise motor cortex excitability. Early patients at NIMH were discharged after treatment. FDA clearance came in 2008.

OTHER RELEVANT

1. For mild depression, regulate sleep first

Williams recommends a consistent sleep and wake schedule, CBT for insomnia, and keeping the bedroom for sleep and intimacy only, with no TV, food or phone. He says getting sleep right is 'half the battle'.

2. Exercise and slow breathing are reasonable starting points

They fit the brain–heart regulatory pathway and have supporting evidence in mild depression. Severe depression usually needs clinical treatment.

3. Everything discussed requires medical supervision

Ibogaine, 5-MeO-DMT, MDMA and psilocybin therapies are not approved treatments in the U.S. and require screening and supervision. SNT's device is FDA-cleared and is being rolled out through a company Williams' former students joined, with trials still recruiting.

Biology & Treatments for Compulsive Eating & Behaviors | Dr. Casey Halpern

Guest: Dr. Casey Halpern
Date: 2022-09-26 · Duration: 2:14:35
URL: https://www.youtube.com/watch?v=Nr5xb-QCBGA

KEYPOINTS

1. Deep brain stimulation delivers medication as electricity
Halpern, a neurosurgeon, describes DBS as implanting a thin insulated wire whose tip contacts deliver current from a pacemaker-like pulse generator to a tiny brain region. The most consistent effect is immediate relief of tremor, even after 20 years of shaking. Side effects within a few millimeters, such as brief laughter or panic, revealed therapeutic uses: Parkinson's patients sometimes report that gambling, compulsions or low mood improve along with tremor.

2. OCD involves dysregulated, not simply overactive, cortical circuits
The orbitofrontal and prefrontal cortex, which support inhibitory control, function abnormally in OCD, along with their projections to the dorsal striatum (caudate and putamen) and the ventral striatum, including the nucleus accumbens. Halpern cautions against thinking of 'up or down' activity; the aim is to normalize function.

3. DBS for OCD helps only some patients so far
Surgical risk for OCD is similar to that for tremor, but the payoff is less reliable. About 50% of patients respond, and responders still have symptoms, so many psychiatrists hesitate to refer. Halpern performs DBS for OCD in only three to five patients a year and is leading research to target obsessions more specifically. He sees obsessive traits on a spectrum, some of which help in surgery or business.

4. The nucleus accumbens gates reward-seeking, and strong rewards can hijack it
When the ventral striatum is perturbed, rats pursue rewards despite foot shocks. In mice, two weeks of 60% fat food leaves the nucleus accumbens functioning abnormally, partly hyperactive and partly hypoactive, likely predisposing continued overeating and eventually habit. Halpern views loss of control as a common thread across binge eating, addiction and OCD, though it is not a formal diagnosis.

5. Not all obesity is a binge-eating problem
Obesity is a phenotype with many causes. Halpern credits mentor Tom Wadden with warning that only about 20% of people with obesity show addiction-like eating, still an enormous number. Binge eating disorder affects an estimated 3 to 5% of people and is likely underdiagnosed in obesity.

6. A binge has a strict definition; loss-of-control eating is far more frequent
A binge requires loss of control plus eating an unusually large amount in a short time, perhaps half a day's calories compared with normal meals. Severe cases binge about once a day; moderate cases three to four times a week. Loss-of-control eating can occur dozens of times a week, with some trial patients reporting 20 to 30 episodes.

7. A two-hit model for how binge eating develops
Halpern's hypothesis, which he says is unpublished: the first hit is a predisposition everyone shares to some degree, magnified by cheap, refined, hyperpalatable food we did not evolve with, such as high-fructose corn syrup even in bread. The second hit is a stressor, probably recurring. Shame adds a third layer. Both anxiety and disinhibition, as with alcohol, can trigger binges, suggesting imbalance in either direction.

8. Episodic stimulation beats continuous stimulation for episodic disorders
Depression or Parkinson's may behave like 'state' disorders needing continuous therapy. Binge eating, addiction and OCD involve intermittent episodes in otherwise normal days. In mice, Halpern's group, publishing in PNAS, found a nucleus accumbens signal that predicts loss of control; triggering 5 to 10 seconds of stimulation only then blocked binges durably, while continuous stimulation lost its effect, likely through tolerance. Over time the predictive signal itself became less frequent.

9. Anorexia and compulsive overeating may be more alike than different
Both can reflect compulsions to over- or under-eat despite risk, shaped by social pressures and similar brain vulnerabilities. Anorexia has the highest mortality of any psychiatric condition, from suicide and metabolic complications. Because implanting devices in very underweight patients risks wound erosion, non-invasive approaches are needed, but targets must first be found inside the brain.

EXAMPLES

1. Hunting for 'craving cells' in the operating room
In a first-in-human trial at Penn for patients who failed gastric bypass, fasted patients stay awake while a fine electrode is lowered into the nucleus accumbens and they view photos of foods they crave, like donuts. The goals: find craving-related cells, as surgeons find tremor cells by their sound in Parkinson's; capture a brief mood lift from stimulation; and confirm placement within about 0.5 mm with intraoperative CT and tractography. These results were unpublished at the time.

2. Provoking a binge in the lab
With the device implanted, a psychiatrist and eating disorder specialist induce each patient's own pre-binge negative mood while video and an eye tracker are synchronized to brain recordings. Even fully aware, under observation through a one-way mirror, treatment-resistant patients still lose control, which is why awareness alone is not enough for them.

3. Huberman's ephedrine superstition
Huberman recounts that a sports stimulant containing ephedrine in his youth triggered compulsive knocking on wood mid-exam, which vanished when he stopped. Halpern suggests a predisposition, noting Huberman's childhood throat-clearing tic. Tics in young males are common and often fade, though they can return with fatigue.

4. Focused ultrasound for essential tremor

MRI-guided focused ultrasound, FDA-approved for tremor, ablates a target with no incision. Essential tremor is about 10 times more common than Parkinson's and the most common neurological condition over 70; Halpern wrote to Bill Clinton hoping he would champion it. Using it for OCD or eating disorders awaits knowing where to ablate.

OTHER RELEVANT

1. Cultivate awareness of pre-behavioral states

Binges are often preceded by a dip in mood, stress or anxiety. Noticing that the thought of a donut is gaining allure is, for most people, a powerful tool until targeted non-invasive treatments exist.

2. Be cautious with stimulants and drugs if you are prone to compulsions

Halpern says he likely sits on the mild end of the obsessive spectrum himself and avoids drugs beyond a little wine for that reason.

3. TMS shows promise but remains imprecise

Transcranial magnetic stimulation over the frontal lobe is FDA-approved for depression, OCD and nicotine addiction. Halpern wants it to probe with purpose, reaching deep targets indirectly through connected surface regions, and is pairing TMS and invasive OCD trials.

4. Strength training with expert supervision

A trainer corrected Halpern's poor surgical posture with core work and powerlifting, including deadlifts. He was mildly hurt only when training alone; for people whose hands are their livelihood, he says close supervision is essential.

LIVE EVENT Q&A: Dr. Andrew Huberman Question & Answer in Portland, OR

Date: 2022-08-31 · Duration: 0:51:31
URL: https://www.youtube.com/watch?v=3_auLYOilb8

KEYPOINTS

1. Sleep, food and social connection are modulators; they set the stage but are not direct fixes
Answering a question on traumatic brain injury, Huberman separates foundational behaviors (sleep, nutrition, social connection, avoiding chronic stress) from interventions that act directly on the nervous system. The foundations matter for nearly every brain condition but set what is possible rather than producing a specific change, and people with TBI should prioritize them.

2. Hyperbaric oxygen looks promising for TBI, mostly through better sleep
He calls the hyperbaric chamber data for brain injury very encouraging. Brief hyperoxygenation of the brain seems to improve a number of outcomes, above all sleep quality and duration, and sleep is when most brain repair happens. The catches: chambers are expensive and hard to find, and he says to use one only with a physician or a highly skilled practitioner.

3. EPA omega-3s at roughly 1–2 g per day have a growing evidence base for brain health
Without a chamber, he points to the essential fatty acid EPA, with an effective threshold of about 1–2 grams of EPA a day from food or supplements. He says prescription EPA is now being given to some TBI patients, and that above about 2 g/day EPA has matched SSRIs as an antidepressant in some clinical trials. He credits Dr. Rhonda Patrick as the leading advocate of higher EPA doses.

4. Dopamine narrows focus; addiction is a progressive narrowing of what gives you pleasure
Elevated dopamine, from excitement or drugs, narrows attention and drives you to seek more of whatever you're focused on. Huberman defines addiction as a progressive narrowing of pleasure sources and a good life as their progressive expansion. The best way down is to stop pursuing more dopamine after big peaks, which explains the post-party or Monday blues.

5. Random, intermittent reward is the healthiest reward schedule
Rather than rewarding yourself or your kids every time, he argues for occasional, unpredictable reward, the schedule slot machines exploit. Rewarding every outcome, or only winning, can unbalance the dopamine system; he suggests this is partly why so many high performers crash and burn.

6. Low-angle morning and evening sunlight is the best circadian signal because of its color contrast
He cites Jay and Maureen Neitz at the University of Washington: the eye's clock-setting neurons respond best to yellow–blue contrast and orange tones, which are present when the sun is low and absent at midday. Daylight simulators deliver only brightness, not this contrast. He proposes that color vision may have evolved first to tell time of day, with color perception secondary.

7. Shift workers should bundle all of their time cues together
Light is the strongest clock signal, followed by movement and changes in body temperature, with meal timing and social activity also playing a part. A rise in body temperature promotes alertness, and core temperature drops 1–3 degrees to bring on sleep. When coming off a night shift, he advises combining sunlight (no sunglasses), exercise, coffee, a meal and social contact inside the same window of about 1–2 hours for at least 2–3 days, so the internal clocks lock onto it.

8. Close-up screen viewing physically lengthens the eye and drives myopia
Spending hours focused on things within about two feet of your face lengthens the eyeball, so the image lands in front of the retina. In clinical trials, mainly in children, two hours a day outdoors reduced or even reversed myopia. He recommends at least 10 minutes of looking at things more than 10 feet away for every 30 minutes of close-up work, and argues that the narrow visual window also makes our thinking 'myopic'.

9. Self-induced adrenaline is a training ground for staying calm under arousal
Wim Hof-style cyclic hyperventilation (about 25 deep breaths) and cold exposure both release adrenaline. Citing his colleague David Spiegel, Huberman says that choosing to enter a high-arousal state is very different from being thrown into one. Deliberate adrenaline lets you practice keeping a clear mind while your body is agitated. You can adjust the dose with colder water, longer immersion, moving your limbs, or more breaths.

10. Hard stimuli work better when used sparingly
Cold, sauna and long endurance efforts all bring adaptation, and he warns that pushing them ever further, as some ultrarunners do, can turn into dopamine chasing. He suggests about three ice baths a week is plenty. In contrast, try to get sunlight every day, but if you miss a day, simply stay out twice as long the next day. Focused practice three times a week is enough to learn a language or an instrument.

EXAMPLES

1. A cold-water dopamine rise of about 2.5x that lasts
He cites findings from other labs that immersion in water as mild as about 60°F produces a long-lasting dopamine increase of roughly 2.5 times baseline, which he describes as comparable to some prescription drugs.

2. PNAS study: breathing and E. coli injection
People trained in cyclic hyperventilation were injected with E. coli endotoxin alongside a meditation group. The meditators developed nausea, vomiting, diarrhea and fever, while the breathing group had far fewer symptoms or none. His explanation is that adrenaline temporarily suppresses innate immune responses, which is why people often get sick on vacation right after a stressful stretch.

3. Glenn Jeffery's red-light vision protocol

Volunteers looked at red light (sometimes a flashlight with a red film) from about two feet away for a few minutes in the morning. It improved photoreceptor mitochondrial function, cut reactive oxygen species and improved acuity and some color vision. It only seemed to work in people over 40 and within the first three hours after waking. Sessions of 1–2 minutes a week produced effects lasting up to three weeks.

4. Sauna marathon and growth hormone

Repeated 30-minute hot sauna sessions with 5-minute breaks, about two hours in one day, raised growth hormone roughly 16-fold in humans; daily or several-times-weekly use gives diminishing returns. Real sauna benefits need about 80–100°C, which most infrared saunas do not reach.

5. How Wim Hof found his method

Grieving his wife's suicide, with four children at home, Hof went into a cold Amsterdam canal. The shock let him anchor his thinking, and he later found breathing could do something similar. Huberman adds that he nearly injured his leg badly on a 2016 mountaineering trip with Hof.

OTHER RELEVANT

1. Clinical dopamine blockade is a last resort, not a habit tool

For severe agitation, obsession and insomnia, some psychiatrists prescribe a single very low dose of a dopamine receptor blocker such as haloperidol. Huberman stresses that it must be prescribed and that blocked dopamine feels bad. For most people, behavioral control of the reward system is the right first approach.

2. Fermented foods over high-dose probiotics for the gut

Citing Stanford's Justin Sonnenburg and Christopher Gardner, he reports that about four servings a day of fermented foods (kimchi, sauerkraut, kombucha) improved the microbiome and immune markers. Expensive high-dose probiotics, by contrast, can cause brain fog and are meant for severe dysbiosis.

3. Taper out of stress with some arousal

Rather than going straight from intense work to pure rest, which is when people often get sick, he suggests adding some adrenaline-raising activity, such as cold exposure or deliberate breathing, as a stressful period winds down.

4. Draw on gratitude and love, not fear, for hard things

Huberman admits he long used imagined battles and fear of shame to get himself through hard tasks. It works, but it feels like a downward spiral. Now, before something hard, he thinks of the people and animals who supported him, such as his late bulldog and his graduate advisor.

The Neuroscience of Speech, Language & Music | Dr. Erich Jarvis

Guest: Dr. Erich Jarvis
Date: 2022-08-29 · Duration: 1:54:20
URL: https://www.youtube.com/watch?v=LVxL_p_kToc

KEYPOINTS

1. There is probably no separate language module in the brain
Jarvis argues speech and language are psychology-derived terms that do not map neatly onto brain function. Rather than a language center instructing other areas, the complex algorithms for spoken language are built into the speech production pathway that controls the larynx and jaw, and the algorithms for understanding speech live in the auditory pathway.

2. Understanding speech is common; producing learned sounds is rare
The auditory perception pathway is widespread in animals, which is why dogs can learn several hundred human words and great apes several thousand, yet cannot say one. The speech production pathway is specialized in humans, parrots, songbirds and hummingbirds, only three of roughly 40-plus bird orders. Koko the gorilla, raised with humans for 39 years or more, learned sign language but could not produce the sounds.

3. Innate vocalizations and learned speech use different circuits
Most vertebrates vocalize, but with innate sounds such as crying or barking controlled by brainstem and hypothalamic circuits. Learned vocalization uses forebrain circuits. In humans and parrots, the forebrain has taken direct control of brainstem vocal circuits, enabling imitation.

4. Songbirds and humans converged on the same circuits and genes
Parallels include critical periods, deterioration of vocalizations after deafness, and homologous areas, such as the robust nucleus of the arcopallium and laryngeal motor cortex. The specialized genes, and even similar mutations, overlap despite a common ancestor 300 million years ago. FoxP2 mutations that cause human speech deficits cause similar deficits when induced in vocal-learning birds. Jarvis thinks spoken language arose in our ancestors within the last 500,000 to 1 million years and that Neanderthals likely had some form of it.

5. Speech circuits switch off repulsion genes and turn on neuroprotection
Jarvis's lab predicted connectivity genes would differ in speech circuits, which have a direct cortical connection to the motor neurons of the larynx or syrinx. Surprisingly, several axon-guidance genes that normally repel connections were turned off, allowing connections that would not otherwise form. Calcium-buffering and neuroprotective genes such as parvalbumin and heat shock proteins were turned up, probably because laryngeal muscles are the fastest-firing in the body, so their control neurons need protection from toxicity.

6. Critical periods are strongest for speech
The whole brain passes through critical periods, but speech has an especially strong one; feral children who pass puberty without language struggle to acquire it. Jarvis's view is that the brain has limited capacity and stability aids survival. Humans carry an extra copy of SRGAP2, which keeps speech and other circuits more juvenile and plastic throughout life than in other animals.

7. Multilingual children keep more phonemes, easing later languages
We are born able to produce many phonemes and narrow them to those our language uses. People who learn several languages early retain more of them, so a third or fourth language is easier, not because of greater plasticity but because the sounds are already available.

8. Only vocal learners dance
Aniruddh Patel and others found that synchronizing body movement to a musical beat is limited to vocal-learning species. Jarvis's motor theory of vocal learning origin holds that speech pathways evolved by duplicating surrounding motor-learning circuits. The tight auditory-motor integration needed for speech then spread to neighboring regions, letting us coordinate whole-body movement to sound. Speech carries more semantic meaning; dance carries mostly affective, bonding communication.

9. Semantic and emotional communication share circuits but differ by hemisphere
Courtship song and meaningful words use the same song or speech circuits, with emotional centers in areas such as the hypothalamus and cingulate adding tone. The left hemisphere dominates speech, while the right is more balanced for singing and music. All vocal learners use learned sounds emotionally; only a few, including humans, some parrots and dolphins, use them semantically.

10. Reading and writing run through silent speech
When you read, visual signals travel to Broca's area and you silently speak the words, with tiny electrical signals reaching the vocal muscles. Writing works the same way, so speech bridges thought and the written word. Writing flows best when your hand or typing keeps pace with your inner speech.

EXAMPLES

1. The caninch and the Bengalese finch
A zebra finch raised with a canary at Rockefeller sang a hybrid song. A young zebra finch placed between its own species and a Bengalese finch learned its own species' song, but learned the Bengalese song well if its own species was removed. Peter Marler called this the innate predisposition to learn, akin to linguists' universal grammar.

2. Stuttering birds and the basal ganglia
Damage to the striatal part of the songbird speech pathway caused stuttering as the region recovered, driven by new

neurons not yet integrated properly. Birds recovered in three to four months thanks to neurogenesis mammals lack. In humans, basal ganglia disruption is also implicated in both acquired and developmental stuttering.

3. Snowball the cockatoo

The cockatoo famous for dancing to music, with many imitators online, illustrates the 2009 finding that vocal learners can entrain to a beat; Jarvis says Snowball out-dances some scientists in one video.

4. Jarvis's path from ballet to birdsong

From a family of singers, he won dance contests as a teen, trained at the High School of Performing Arts, Alvin Ailey and Joffrey schools, and was invited to audition for the Alvin Ailey company. He chose science instead, studying birdsong with Fernando Nottebohm at Rockefeller, and still dances, which he believes keeps his brain sharp.

5. Sequencing all vertebrates

Jarvis leads the Vertebrate Genomes Project, aiming to sequence all 70,000 vertebrate species, within the Earth BioGenome Project's goal of all 2 million eukaryotes. Older genomes contained errors such as false gene duplications. Skin and fur color show convergence: darker pigmentation near the equator repeatedly evolved through the same melanin-related genes.

OTHER RELEVANT

1. Keep moving to stay cognitively sharp

Because speech circuits sit beside motor circuits, Jarvis argues consistent movement, such as dancing, walking or running, plus practicing speaking or singing, helps keep cognitive circuits in tune into old age. He offers this from personal experience, not a trial; Huberman reports long slow runs help him prepare for long solo episodes.

2. Treat stuttering with sensorimotor tools

Speaking more slowly and tapping out a rhythm, approaches that tie what you hear to what you produce, help many adults reduce stuttering. Stuttering does not indicate slow thinking.

3. Match writing speed to thought

Huberman writes by hand with a Pilot V5 or V7 pen because it lets his writing rate match his thinking. Karl Deisseroth's practice is to sit still and think in complete sentences. Silently singing lyrics warms up speech circuits before talking.

4. Mind the speed of short-form text

Jarvis does not think texting erodes language ability; it repurposes it. But short messages are easy to over- or under-interpret, and fast writing can expose unfiltered meaning. He half-jokingly suggests technology buffers that would tell you to slow down before sending a bad thought.

What Alcohol Does to Your Body, Brain & Health

Date: 2022-08-22 · Duration: 2:01:02
URL: https://www.youtube.com/watch?v=DkS1pkKpILY

KEYPOINTS

1. Even one to two drinks a day is linked to brain thinning
Heavy drinking (about 12–24 or more drinks a week) has long been known to degenerate the neocortex. A UK Biobank study of more than 35,000 healthy middle-aged and older adults found that an average of one to two drinks a day was also associated with thinning of the neocortex and other regions. Huberman stresses that 'chronic' refers to the pattern, so 14 drinks packed into a weekend counts too.

2. Alcohol is a toxin your liver converts into a worse toxin
Ethanol is both water- and fat-soluble, so it enters every cell directly. NAD-dependent steps convert it into acetaldehyde, which damages and kills cells indiscriminately, and then into acetate, which can be burned for fuel. The NAD-to-NADH step limits the rate, so when it falls behind, acetaldehyde builds up and liver cells take the hit. That is why alcohol counts as 'empty calories'.

3. Drinking removes top-down inhibition, and regular drinking rewires habit circuits
Alcohol suppresses the prefrontal brake on impulsive behavior while you are drunk. Even a once-a-week pattern of three or four drinks adds synapses in circuits for habitual behavior and removes them in circuits that control behavior, so people become more impulsive when sober too. Two to six months of abstinence generally reverses this, though years of heavy drinking leave lasting effects.

4. The serotonin lift is brief, and the next drinks can't bring it back
Acetaldehyde first makes serotonergic mood circuits hyperactive, which explains early talkativeness and well-being. Activity then drops, prompting another drink. By the third to fifth drink there is essentially no chance of recovering the high. Instead the forebrain and motor areas shut down, causing slurring, shuffling and eventually passing out.

5. Regular drinkers have higher cortisol even when sober
One drink a night, or two to four on weekends, shifts the hypothalamic–pituitary–adrenal axis toward more baseline cortisol, which lowers stress thresholds. This also explains 'hangxiety'. Huberman notes that people cutting back should expect a temporary rise in anxiety while the axis readjusts.

6. Genes and starting age shape the risk of alcoholism
Risk genes cluster in serotonin, GABA and HPA-axis pathways and interact with environment, trauma and social pressure. People with little alcohol dehydrogenase flush and feel sick, which tends to protect them. A warning sign is being able to drink all night with increasing energy, especially with blackouts. Starting young greatly raises dependence risk even without a family history.

7. Alcohol damages the gut–liver–brain axis in a way that drives more drinking
It kills beneficial gut bacteria and makes the gut leaky, so bacteria move into the bloodstream. Meanwhile the liver releases pro-inflammatory cytokines. These signals reach the brain and promote further drinking, a vicious cycle that is especially strong in alcohol use disorder.

8. Cancer risk rises with every daily drink, especially breast cancer
Each 10 g of alcohol a day, about one drink, raises cancer risk by roughly 4–13% depending on the study. A weekend total that averages to that counts the same. Alcohol both promotes tumor growth and suppresses anti-inflammatory and immune defenses. The association has been documented since a landmark 1987 paper.

9. Alcohol shifts testosterone toward estrogen
A 2000 review in the journal Alcohol describes alcohol's metabolites increasing aromatization of androgens to estrogens in the ovary, placenta, liver, testes and other tissues. In women this may be part of why estrogen-related cancers rise. Huberman notes that estrogen should never be driven too low in either sex, because it supports cognition and joints.

EXAMPLES

1. Hangover ranking by congeners
From least to most hangover-inducing in comfortable amounts: ethanol in orange juice, beer, vodka, gin, white wine, whiskey, rum, red wine, and brandy at the top. Because ethanol in orange juice ranks lowest, sugar is not the culprit. Congeners such as nitrites, which add flavor, track with severity.

2. Alcohol gives you pseudo-sleep, not real sleep
Citing Matt Walker, Huberman says even one glass of wine or one beer disrupts slow-wave and REM sleep. Drinking to fall asleep produces low-quality rest, which is part of why hangovers feel so bad.

3. Resveratrol doesn't rescue red wine
Even if resveratrol is beneficial, which is debated, you would need so much red wine to get a useful dose that the harms would outweigh any benefit. He notes David Sinclair confirmed this on an earlier episode.

4. Cold for clearance, but not while drunk
A small literature suggests raising epinephrine may speed parts of alcohol metabolism, lending some support to the old cold-shower lore. Because alcohol lowers core body temperature, getting into a pool or lake while inebriated is dangerous; only use cold exposure once sober.

OTHER RELEVANT

1. Rebuild your gut with low-sugar fermented foods

Justin Sonnenburg and Christopher Gardner's Stanford work found that 2–4 servings a day of kimchi, sauerkraut, natto, kefir or live-culture yogurt lowered inflammatory markers. This hasn't been tested specifically in alcohol use disorder, but Huberman considers it a logical repair step. Probiotics and prebiotics are an alternative with less human data.

2. Partially offset cancer risk with folate and B12, without relying on them

Folate and B vitamins, especially B12, have been shown to reduce, but not eliminate, alcohol-related cancer risk, probably because alcohol disrupts B-vitamin pathways. They are not a license to drink.

3. Manage a hangover with a few things that work

No single remedy works; Examine.com's review of purported cures, from Japanese pear juice to yohimbine, finds weak evidence. Electrolytes before bed and on waking, fermented foods and safe cold exposure address dehydration, gut disruption and depleted epinephrine and dopamine.

4. Quitting heavy use needs medical guidance

For people with serious alcohol use disorder, stopping cold turkey can be medically dangerous. The path to sobriety differs between people, so work with clinicians. Reward and pain systems reset after abstinence, with timing that depends on how much and how long you drank.

LIVE EVENT Q&A: Dr. Andrew Huberman Question & Answer in Seattle, WA

Date: 2022-08-17 · Duration: 0:56:04
URL: https://www.youtube.com/watch?v=2Ds1m5gflCI

KEYPOINTS

1. Huberman's most-used protocols: morning and sunset light plus daily NSDR
He views morning sunlight and the sunset every day and does 10–30 minutes of non-sleep deep rest (NSDR) daily, usually in the early afternoon or after a short or poor night. He coined 'NSDR' to make practices like yoga nidra less off-putting, and first saw them used daily at a trauma and addiction treatment center in Florida.

2. In dark winters, get more light and catch the light before sunset
Asked about Seattle, where sunrise swings from 4:30 am to 9 am, Huberman says you don't need to see the sun cross the horizon; aim for low-angle sunlight, and use bright indoor lights if you're up before dawn. In winter he suggests about 30 minutes of daylight viewing and, crucially, getting outside before the sun goes down so your brain knows where it is in the day.

3. Waking without drive may come from deep sleep or waking mid-cycle
His guess for a listener who goes to bed fired up but wakes flat: very deep, parasympathetic sleep makes the transition out harder, and waking mid-cycle makes it worse. He suggests trying an alarm timed to the end of a 90-minute cycle, for example 6 or 7.5 hours instead of 7. His own morning: 'I want water. I want sunlight. 90 minutes later I want caffeine.'

4. To remember something, spike adrenaline after learning, not before
Citing James McGaugh's work and Larry Cahill's at UC Irvine (with stories going back to medieval times of children being thrown in a river after a lesson), Huberman says arousal right after learning strengthens memory. Beta-blockers given after emotional learning weaken it. He now uses cold water exposure after learning for this, and warns against excessive stimulants.

5. The test for social media addiction: you keep doing it although it isn't interesting
Dopamine hits come early; mindless scrolling afterward means 'driving that wave pool down'. Phones also tap the brain's maps of where people are, when you'll see them and how close you are to them, which is why people text the moment a plane lands. He suggests phone-off breaks of at least an hour, noting that when he switched off every odd hour, some relationships couldn't tolerate it.

6. Failure sharpens focus for the next attempt, but too much failure trains you to expect failure
After a miss, the forebrain commits more resources and focus narrows, which helps unless it narrows so far that you lose useful information. Over the longer term, the brain as a prediction machine starts expecting failure without wins, so he gives lab students an early publication and values team support.

7. Virtuosity means inviting back uncertainty
Huberman describes four tiers of performance: unskilled, skilled, mastery (predictable outcomes) and virtuosity, which reintroduces uncertainty. For elite performers who already have sleep and nutrition sorted, he points to creativity. Unpredictable inputs such as nature, aquarium videos and the state between sleep and waking loosen top-down rules, ideally without the destructive substances many creatives have used.

8. Dopamine makes whatever it's paired with seem important
Stimulating dopamine release paired with even an 8 kHz tone remaps the brain to favor that tone. Stimulant drugs (and, he notes, MDMA, with its unusual high-dopamine, high-serotonin state) make anything seem interesting, which is why he says such compounds belong in university clinical trials. High-novelty seekers have 'an eight-cylinder car' and need to drive it carefully.

9. Behaviors first, then nutrition, supplements and drugs
His foundation is essential fatty acids (fish oil or fish), fermented foods (based on Justin Sonnenburg's and Chris Gardner's Stanford work) and vitamin D3 for those who are deficient. He sometimes uses alpha-GPC for focused work. 'No supplement actually rewires you… behaviors do that.'

10. ADHD: time medication carefully, or train focus without it
With a physician, find the minimal effective dose and the right time of day; in the first 8–9 hours after waking, cortisol, dopamine and epinephrine systems work most effectively. Without medication, focus can be trained, for example with visual-target drills used in China, but 'it feels terrible to train it'. Some people can lower or stop medication this way; others can't.

EXAMPLES

1. Physiological sigh study with David Spiegel and Melis Yilmaz Balban
In a large pandemic-era study with remote monitoring, a brief daily practice of the physiological sigh (double inhale, long exhale) was the most effective of the breathing protocols tested for improving heart rate variability, lowering heart rate and improving sleep. At the time the paper was still under review.

2. Matthew Johnson's answer on microdosing: 'macrodose'
The Johns Hopkins psychedelic researcher told Huberman that one guided, high-dose session that directs plasticity seems far more useful than undirected nudges. Huberman's analogy is that opening plasticity is like running: the goal is to run in a particular direction. He urges caution for young people and those with psychiatric or addiction histories.

3. New neurons in terminally ill adults
To a 66-year-old asking whether it's too late to learn, Huberman cites Rusty Gage's Salk Institute work showing new hippocampal neurons even in terminally ill people, and Richard Feynman learning to draw late in life. Focus and sleep get harder, but the mechanisms remain.

4. Two 20-minute office naps a day

A Howard Hughes investigator Huberman knows naps twice daily, and once used their scheduled meeting time for a nap before giving a great talk.

OTHER RELEVANT

1. Schedule recovery at least every three days

As a young scientist, Huberman worked hard Monday and Tuesday, came in late or not at all Wednesday, pushed hard Thursday and Friday, and took Saturday off. Find non-destructive ways to reset dopamine and energy, such as long walks, exercise or NSDR.

2. Four questions for reading a paper

What question are they asking? What did they do (species, conditions, methods)? What did they find? What did they conclude, and does that actually answer the original question? Take notes, and explain the paper to someone to remember it.

3. Advice for scientists who want to communicate

Get rigorous formal training first. Share what genuinely excites you, however nerdy. Do it to be useful, not for followers. He recalls the late Ben Barres warning that colleagues may dislike it, 'so whatever you do, you better make it good.'

Exercise, Nutrition, Hormones for Vitality & Longevity | Dr. Peter Attia

Guest: Dr. Peter Attia
Date: 2022-08-15 · Duration: 2:50:02
URL: https://www.youtube.com/watch?v=DTCmprPCDqc

KEYPOINTS

1. Bloodwork helps with lifespan but says little about healthspan
Attia splits longevity into lifespan (not dying of the 'four horsemen': atherosclerotic disease, cancer, neurodegeneration and metabolic disease) and healthspan (cognitive, physical and emotional function). Biomarkers give decent insight into heart disease and Alzheimer's risk, which overlap heavily, but have a big blind spot for cancer and Parkinson's. Healthspan needs functional testing. He calls emotional health the piece without which none of the rest matters.

2. Everyone should be screened for Lp(a) early
Lipoprotein(a) is the most prevalent genetic driver of atherosclerosis. Roughly 8–12% of people (possibly up to 20%) have levels high enough to contribute to disease, yet most physicians do not check it. Because it is genetic, a single early test is informative.

3. Plan from your 'marginal decade' backward
Patients answer about 50 prompts describing what they want to be able to do in their last decade, such as picking up a great-grandchild or getting up off the floor. Attia then compares that with how strength and VO2 max decline with age. He borrows the term 'backcasting' from Annie Duke. Nearly everyone finds they need to be much fitter and stronger now than they assumed.

4. Fitness and strength outweigh most other modifiable risk factors
Smoking raises all-cause mortality risk by about 40% at any given moment (it does not shorten life by 40%). High blood pressure and type 2 diabetes each add roughly 20–25%, and end-stage kidney disease about 175%. By contrast, low versus high muscle mass is about a 3× hazard and low versus high strength about 3.5×. Bottom-quartile VO2 max versus the top 2.5% for one's age is roughly 5×, the strongest association he has seen for any modifiable behavior.

5. Exercise is the most important thing for brain health, and the first dose matters most
In the context of Alzheimer's prevention, Attia says going from sedentary to about 15 MET-hours a week (roughly three hour-long brisk walks) cuts risk by about 50%. More exercise still adds benefit at a slower rate, and it supports the functional, healthspan side that mortality data do not capture.

6. Strength training is the best bone builder, especially before age 25
His team expected running to win, but powerlifting came out best because muscles pulling on bone through tendons activate osteoblasts. Peak bone density is set in youth, which matters most for women. Heavy inhaled or oral corticosteroid use during that window can impair it. Attia tracks DEXA Z-scores; for example, he aims to move a " 1 to 0 over four years even though bone density would normally decline.

7. The WHI hormone-therapy scare rested on a misleading headline
The trial enrolled women more than 10 years past menopause, without symptoms, and disproportionately unhealthy (he recalls about 40% were smokers). It used horse-derived conjugated estrogen and synthetic MPA instead of today's bioidentical estradiol patch and micronized progesterone. The reported 27% relative rise in breast cancer was an absolute change from 4 to 5 cases per 1,000, or 0.1%. Estrogen given without progesterone to women with a uterus does raise endometrial cancer risk.

8. Testosterone therapy in men: modest doses, careful estradiol, and fertility first
Attia's clinic uses lower, more frequent subcutaneous testosterone cypionate injections, once or twice a week with a small needle, and avoids pellets. About 20% of men need a micro-dose of anastrozole to keep estradiol at 30–50 pg/mL, and he never wants it below 25. Men who still want children are steered toward hCG alone because TRT lowers sperm count. He has stopped using Clomid after seeing it raise desmosterol, an unpublished clinic observation.

9. ApoB is the causal lipid target, and diet alone rarely gets it low enough
Atherosclerosis essentially cannot develop below about 20–30 mg/dL of apoB, a level most people pass by their teens. Cutting carbohydrates lowers triglycerides, but raising saturated fat can push apoB up. Drug options include statins (which in trials do not impair cognition), ezetimibe (better responders show high phytosterols), bempedoic acid (liver-only and fewer side effects) and PCSK9 inhibitors, the most potent.

EXAMPLES

1. 'Attia's rule' for supplement debates
Huberman's paraphrase: don't argue about supplements or diet tribes until your VO2 max is at least 75th percentile, you can dead hang for a minute, wall-sit for two and deadlift your body weight for 10 reps. Attia also gives supplement-heavy patients a seven-question spreadsheet, and many find they cannot justify about 80% of what they take.

2. Nicotine lozenges, not stimulants
Attia has cycled on and off low-dose nicotine for about 10 years and says he gets no withdrawal. He warns it is addictive for many people, and that lozenges deliver 4–8 mg compared with about 1 mg per cigarette. His clinic will not prescribe Adderall or Vyvanse for focus. He recalls a half dose of armodafinil leaving him so locked in during a talk that he stopped blinking.

3. Semaglutide in practice
The trial dose of 2.4 mg weekly took about 16 weeks of titration. Attia's clinic usually gets enough benefit at 1–2 mg, though some patients can't tolerate the nausea. He thinks about 80% of the effect is in the hypothalamus. The drugs are catabolic,

so patients lose muscle as well as fat, and weight returns after stopping.

4. Strength Metrics Assessment

His clinic runs patients through 11 hard tests, including dead hangs, and grip strength, leg extensions and wall sits, which are the strength measures most studies use.

OTHER RELEVANT

1. Get early, broad screening, then retest roughly yearly

Include Lp(a), apoB and genetics such as APOE. Pair the blood panel with a DEXA scan for lean mass, fat and bone density, plus functional strength and VO2 max tests.

2. Put exercise first

Aim beyond minimal guidelines: build VO2 max and strength well above where you need to be at 90. The 'glider' of aging descends faster than people expect.

3. For menopausal symptoms, revisit HRT with a doctor

Vasomotor symptoms (hot flashes and night sweats) usually pass within a few years. Vaginal atrophy, bone loss and brain fog persist. Attia believes the WHI-era fear is largely unfounded for modern bioidentical regimens started near menopause, and that progesterone must be included if the uterus is intact.

Sleep Toolkit: Tools for Optimizing Sleep & Sleep-Wake Timing

Date: 2022-08-08 · Duration: 1:41:54
URL: https://www.youtube.com/watch?v=h2aWYjSA1Jc

KEYPOINTS

1. Good sleep starts in the morning with an early cortisol peak
Huberman organizes the toolkit around three daily critical periods: the morning, the afternoon, and the evening and night. A healthy rhythm puts the daily cortisol pulse near waking. That same signal starts a timer for sleepiness about 16 hours later, supports metabolism, and suppresses leftover melatonin. Most of what you do in the first 60–90 minutes of the day carries through to how you sleep that night.

2. View sunlight within 30–60 minutes of waking, outdoors and not through glass
Aim for about 5 minutes on a clear day (3 one day and 7 the next is fine), about 10 minutes under cloud, and 20–30 minutes on dense overcast or rainy days. Windows and windshields filter the relevant light. A free light-meter phone app pointed at an overcast sky often reads 5,000–10,000 lux, sometimes up to 90,000, which is far more than indoor lights that seem bright. If you wake before sunrise, use bright artificial light until the sun is up.

3. Use cold, movement or both to wake up
A 1–3 minute cold shower or plunge releases adrenaline from the adrenals and the locus coeruleus. Paradoxically, it also makes core body temperature rise more steeply afterward, and that rise drives alertness. Morning movement does the same. Huberman skips rope 10–20 minutes outside while getting sunlight, then takes a cold shower. He cites research pointing to exercise right after waking, 3 hours after or 11 hours after as good times for strength, but says that is fine-tuning.

4. Delay caffeine 90–120 minutes and cap it in the afternoon
Caffeine works by blocking adenosine. Letting residual adenosine clear before your first cup helps avoid the afternoon crash, which otherwise often leads to more caffeine that hurts sleep. Keep caffeine under 100 mg after 4 p.m., and ideally have the last dose by 2–3 p.m. Huberman notes some people, himself included, can drink a 200 mg double espresso at 5–6 p.m. and still fall asleep, but data show caffeine still degrades sleep quality.

5. Afternoon naps, NSDR and late sunlight protect the night
Naps are optional. If you take them, keep them under 90 minutes and not so late that they delay bedtime. Non-nappers can use 10–30 minutes of NSDR, yoga nidra or the Reveri self-hypnosis app instead. Hard exercise late in the day can delay your clock, while exercise in the first 0–4 hours after waking rarely shifts it. Viewing sunlight in the late afternoon, 5–30 minutes depending on clouds, makes the retina less sensitive to artificial light later that night.

6. From about 10 p.m. to 4 a.m., avoid bright light, especially from overhead
Light at night suppresses melatonin. The retinal cells that set the clock sit mostly in the lower half to two-thirds of the retina and so view the upper visual field, which makes overhead lights the worst offenders, especially fluorescent supermarket or gas-station lights. Use lamps set low in the room, dimmed lights, candlelight (about 3–10 lux) or moonlight, compared with 100–1,000 lux from desk and ceiling lights. Huberman has worn sunglasses into a late-night store.

7. Your body has to cool to fall asleep
Core temperature drops 1–3 degrees as you fall asleep. A hot bath, hot tub or sauna in the evening for no more than 20–30 minutes triggers a compensating drop afterward that makes falling asleep easier. Keep the bedroom cool, at least 3 degrees cooler than usual, and add blankets as needed.

8. Alcohol and THC help you fall asleep but degrade sleep architecture
Huberman, echoing Matt Walker, says alcohol and THC may help people fall or even stay asleep, but the sleep is less restorative. CBD and THC edibles appear to reduce anxiety for some people with anxiety-driven insomnia. He prefers supplements that he says do not disrupt sleep architecture.

9. Your temperature minimum lets you shift your clock
Your lowest body temperature occurs about 2 hours before your usual wake time, so around 5 a.m. if you wake at 7. Bright light, exercise or caffeine in the 2–4 hours before it delays your clock and makes you want to sleep and wake later. The same inputs in the hours after it advance your clock. This underpins Huberman's advice on jet lag and shift work.

10. Keep wake times consistent, within about an hour
Sleeping in more than about an hour past your usual wake time destabilizes the rhythm. After a late night, wake near your normal time and be strict about delaying caffeine. To shift to earlier hours, move bedtime and wake time 30–60 minutes earlier each night over about a week, using sunlight and exercise even when groggy.

EXAMPLES

1. Huberman's sleep stack doses
Magnesium threonate 145 mg, apigenin 50 mg and theanine 100–400 mg, taken 30–60 minutes before bed, ideally about 3 hours after eating. Try each alone. If magnesium upsets your gut, or theanine gives you disruptive vivid dreams, your right dose of it is zero.

2. Rotating add-ons
Every third or fourth night he adds 2 g of glycine and 100 mg of GABA. On other nights he adds 900 mg of myo-inositol, which he says helps him fall back asleep and reduces anxiety.

3. Why he avoids routine melatonin
Commercial doses are supraphysiological. Melatonin also interacts with testosterone, estrogen and the timing of puberty, so occasional use for jet lag is probably fine but chronic use, especially in kids, may be problematic.

4. Samer Hattar's 'cave' evenings
Huberman jokes that his friend Samer Hattar, who directs the chronobiology unit at the National Institute of Mental Health, lives in near-darkness at night to protect his rhythm.

5. Falling back asleep
When he wakes at night, Huberman uses as little light as possible. If sleep does not return, he plays the Reveri app's fall-back-asleep hypnosis and says it works '99 times out of 100.'

OTHER RELEVANT

1. Use mouth tape to treat or prevent mouth breathing
Mouth breathing, snoring and sleep apnea are serious health concerns. Huberman suggests medical tape over the mouth at night. Doing low-intensity cardio while breathing only through the nose can gradually widen the nasal airways.

2. Small adjustments for deeper, uninterrupted sleep
Eye masks and earplugs help. Raising the foot of the bed 3–5 degrees may aid lymphatic drainage, but people with acid reflux should raise the head end instead.

3. Shift workers: hold a rotation for about 2 weeks
Rotating between nights and days every few days is very hard on brain and body, so stay on one shift as long as possible. If you have to be up in the middle of the night, for example to feed a baby or study before dawn, dim red light lets you see without disrupting the healthy cortisol rhythm, though it is less practical for full-time night shifts.

4. Do the basics before buying supplements
Morning and afternoon light, caffeine timing, cool and dark evenings, and no alcohol come first. Supplements are for nights the basics are not enough, and many people will not need them.

Tools for Setting & Achieving Goals | Dr. Emily Balcetis

Guest: Dr. Emily Balcetis
Date: 2022-08-01 · Duration: 1:38:18
URL: https://www.youtube.com/watch?v=7YGZZcXqKxE

KEYPOINTS

1. Most motivation tactics take effort themselves, which is why people burn out
When asked how they pursue goals, people mention pep talks, reminding themselves why it matters, and Post-it notes. NYU social psychologist Emily Balcetis points out that each of these is a goal to maintain in its own right, so motivation fades well before the halfway point. Her lab looked for strategies that ride on something automatic. Vision fits: sighted people look at the world without trying, and the way we look can be changed.

2. Elite sprinters narrow their attention like a spotlight
Balcetis expected elite runners at a Brooklyn YMCA, including a 400 m Olympic gold medalist, to monitor everything around them. Instead they described locking a narrow 'spotlight' onto a target, like the finish line, a sign ahead or the shorts of the runner in front, as if wearing blinders. Glancing around, they said, often hurt their race. Among hundreds of competitive New York Road Runners, those who used narrowed focus more often ran faster.

3. Narrowed focus makes the goal look closer, an 'illusion of proximity'
When people spotlight a target, they judge it as nearer, measured both in estimated feet and with visual matching tasks. Looking closer to the finish triggers the goal-gradient effect. In 1940s–50s experiments, hungry rats ran faster and harnessed mice pulled harder as they neared food, spending energy they could barely spare. People also push harder when the end seems close.

4. Long-distance runners switch to narrow focus around the halfway point
Constant spotlighting is tiring, so experienced distance runners look around more early on. They shift to narrow focus about halfway through a 10K and use it most intensely for the final push. The middle of any goal is where people struggle most. Balcetis trains people to picture a circle of light on a single spot, such as their lane's crossing point or a stop sign, then pick the next target once they reach it.

5. Vision boards can backfire by making the goal feel achieved
Gabriele Oettingen's NYU research found that vividly imagining how great life will be after reaching a goal lowers systolic blood pressure, a marker of the body's readiness to act, physical or mental. The fantasy works like a goal already met. Balcetis isn't telling people to drop dream boards, which help clarify what they want, but says goal setting can't stop there.

6. Effective goal setting has three stages: the vision, concrete steps, and obstacles
After defining the big picture, break it into short-horizon plans, like what you can do in the next two weeks. Oettingen's often-overlooked third stage is listing likely obstacles and a Plan B, C and D in advance. In a crisis you'll be short on time and resources, and anxiety may cloud your judgment, so you want the next step already decided. 'You don't look for life jackets once the boat is sinking.'

7. Your body state changes how the world looks
Other labs have shown that distances look farther and hills steeper to people who are chronically fatigued, older, overweight or wearing heavy backpacks. Balcetis argues this is a hidden barrier to exercise: if the walk your doctor recommends looks harder, you're set up for failure before starting. The good news is that the spotlight strategy worked equally well regardless of fitness or weight.

8. We trust vision more than any other sense, rarely realizing it can be wrong
Vision takes up more cortex than any other sense, and when sight and sound conflict we side with sight. We get corrected about what we hear, taste or touch, but rarely about what we see, which is why illusions like 'the dress' or the horse/seal drawing feel so jarring. That naive trust is why changing how you look can be a powerful lever.

9. Micro-goals must be challenging but believable
A goal of one jumping jack gives no satisfaction because there was never any doubt. Huberman does 100 jumping jacks each morning, but a beginner does better with sets of 10 or 25, getting a small hit of accomplishment at each milestone to carry them through the next hard stretch. There is no universal number; set goals realistically but with some inspiration.

EXAMPLES

1. Ankle-weight walking study: 27% faster, 17% less pain
Ordinary participants wore ankle weights equal to about 15% of body weight and did high-knee walking to a finish line. Those trained to narrow their focus moved 27% faster and rated the exercise as 17% less painful than those told to look around naturally, despite identical weight, distance and room.

2. Sugar vs. Splenda Kool-Aid
In a double-blind study, participants drank Kool-Aid sweetened with either sugar or Splenda, and none could tell which. Blood glucose was confirmed after 10–15 minutes. Those given real energy perceived the exercise finish line as closer. Balcetis also found that simply believing you're energized can have similar effects.

3. Michael Phelps's leaking goggles
At the 2008 Beijing Olympics, going for his eighth gold in the 200 m butterfly, Phelps's goggles filled with water. Because his coach had made him practice with loose or no goggles, he already had a plan: count strokes per length. He won, an example of preparing for obstacles ahead of time.

4. Learning drums with data instead of memory

As a new mother, Balcetis set herself the goal of performing one rock song on drums at a public show. Memory told her she was failing. A month of random prompts from the Reporter app showed she had practiced far more than she remembered and that her emotional ratings were trending up.

OTHER RELEVANT

1. Try the spotlight technique on your next walk or run

Pick a visible target, like a stop sign two blocks ahead, imagine a circle of light on it and tune out the periphery until you reach it, then choose the next one. Save the most intense use for when you're tiring or for the final stretch.

2. Track progress objectively

Because memory 'levels and sharpens' the past, use logs or prompt apps to judge whether you're on pace for a deadline. The 1 Second Everyday app, which stitches one-second daily clips into a montage, is another visual way to see your year.

3. Stimulants and arousal narrow the visual window, with caveats

Huberman notes that arousal widens the pupils and narrows visual attention, and that a reasonable amount of caffeine could help. Balcetis gave up caffeine because it made her jittery and anxious; she drinks decaf for the ritual and finds that belief alone can produce similar effects.

4. Attention training may help mood, but it isn't a cure

In depression and anxiety, attention tends to catch on negative, worldview-confirming cues. In interventions where people spend about 10 minutes searching a grid of faces for smiling ones, self-efficacy and energy improve temporarily. Balcetis stresses this doesn't treat the condition itself.

The Science & Treatment of Bipolar Disorder

Date: 2022-07-25 · Duration: 2:19:41
URL: https://www.youtube.com/watch?v=m_OazsImOiI

KEYPOINTS

1. Bipolar disorder is rare, often starts in the early 20s, and is dangerous
About 1% of people have it, compared with 10–17% who have major depression. It typically begins between ages 20 and 25, and an earlier first episode makes it more likely to be a lasting feature. Huberman cites a 20–30% higher incidence of suicide than in the general population. It also ranks among the top contributors to 'global burden', meaning years of normal life lost to disability.

2. Bipolar 1 is defined by mania lasting seven days or more
A psychiatrist looks for at least three of seven symptom categories, present all day, every day, for a week or longer. These include extreme distractibility, impulsivity (one person's ex-spouse bought 10+ air fryers; others book 12 international trips in an afternoon), grandiosity held as genuine belief, flight of ideas, a reduced need for sleep that doesn't bother the person, and rapid 'machine-gun' pressured speech. The person often can't see the shift, but others can.

3. Other causes of mania must be ruled out first
Traumatic brain injury, seizures, amphetamine or cocaine use, and prescribed corticosteroids can all produce identical-looking mania. Diagnosis is hard because the clinician gets a single snapshot, through conversation, of someone who may be on day one or day six of an episode, or using drugs as part of their impulsivity. There is no blood test.

4. Bipolar 2 involves shorter, milder hypomania and more depression
Hypomanic episodes last about four days or less and are less intense. The pattern is not a neat sine wave: some people swing high to low, others rapid-cycle (for example three days manic, three normal, three depressed), and some go manic and then back to baseline without depression.

5. Bipolar disorder is highly heritable, but not a single-gene condition
Heritability is about 85%, which means a susceptibility, usually across sets of genes, that interacts with environmental factors such as early life stress and trauma. Anyone with a twin, sibling, parent, or even a cousin or uncle with bipolar 1 should watch for signs in themselves and their family.

6. Borderline personality disorder differs in its triggers
Borderline personality disorder can produce manic-looking spending, promiscuity or flights of ideas, but these episodes almost always have an external trigger. Bipolar episodes of mania or major depression arise without any trigger, although life stress can worsen symptoms.

7. Lithium reaches patients slowly because it can't be patented
Lithium is element three of the periodic table and cheap, so drug companies had little incentive to produce it. The US FDA approved it for mania only in 1970, 21 years after Cade's paper. It works for many but not all patients, has real toxicity, and needs careful blood-level monitoring, especially in the first three months.

8. Lithium and ketamine act on homeostatic plasticity in opposite directions
Homeostatic plasticity keeps circuits from being too active or too quiet for too long. Citing a Neuron review, 'Targeting Homeostatic Plasticity for the Treatment of Mood Disorders', Huberman explains that lithium lowers the excitability of postsynaptic neurons, while ketamine increases receptor numbers and excitability. Ketamine is effective for major depressive episodes, including in bipolar disorder, but its effects are transient and must be repeated. Lithium also raises BDNF, which permits rather than directs plasticity.

9. Weaker parietal–limbic connectivity may underlie poor interoception
Imaging of people at high risk for, or diagnosed with, bipolar disorder shows reduced connectivity between parietal regions and the limbic system. The parietal lobe then exerts less top-down control over the limbic system. Over time people become poor at interoception, the sensing of their own emotional and bodily states.

10. Talk therapies reduce harm alongside medication
Cognitive behavioural therapy has the most evidence, partly because it has been studied longest, and can sometimes let drugs work at lower doses. Family-focused therapy uses relatives as early-warning observers of sleep and eating changes. Interpersonal and social rhythm therapy addresses relationships, work and school. The goal throughout is harm reduction, because manic spending, promiscuity and broken relationships deepen the depressions that follow.

EXAMPLES

1. John Cade's lithium discovery
An Australian psychiatrist and prisoner of war from 1942 to 1945, Cade suspected that manic patients excreted a toxic substance. He injected their urine into guinea pigs, isolated uric acid, and dissolved it using lithium. In a control experiment, lithium alone calmed the animals. His 1949 paper in the Medical Journal of Australia, 'Lithium Salts in the Treatment of Psychotic Excitement', included case 7: a 40-year-old man, violent for two months, was 'distinctly quieter' four days after starting lithium citrate three times a day and soon left hospital.

2. Judd et al., JAMA Psychiatry
People with bipolar 1 spent about 53% of their time symptom-free, about 32% in major depression and about 15% manic or mixed. People with bipolar 2 spent about half their time depressed, which helps bipolar 2 go unnoticed as plain depression, especially with alcohol self-medication.

3. Omega-3 studies point both ways

Murphy et al. 2012 found that 4 g/day of a 70% EPA formulation worsened manic symptoms over about 16 weeks. A 1999 double-blind trial in 30 adults aged 18–64 found that 9.6 g/day of fish oil for four months greatly reduced bipolar symptoms compared with olive oil. Huberman's takeaway is that high-dose omega-3s seem to help a good number of people, but should never be the only treatment.

4. Creativity in eminent people

A study of 1,000+ eminent 20th-century Westerners, based on biographies, found depression or mania in as many as 90% of eminent poets (about 75% depression, about 20% mania). The figures were as low as about 10% in the military and about 20% in professional athletes, with no mania among the athletes. This is correlation, and the data are indirect.

5. GLP-1 and yerba mate (opening segment)

A Cell paper showed that GLP-1 suppresses appetite through parallel pathways: enteric neurons that cause gut distension, and a gut-to-hypothalamus route that triggers satiety. Huberman drinks yerba mate, which releases far less GLP-1 than the drugs, and avoids the smoked varieties over carcinogen concerns.

OTHER RELEVANT

1. Stay alert to bipolar 2 in people who seem merely depressed

Someone isolating or drinking more may be cycling; their 'normal' stretch may in fact be hypomania. Relatives of people with bipolar 1 deserve extra vigilance.

2. Know the trade-offs of ECT and rTMS

ECT induces a seizure that releases neuromodulators and BDNF and is well established for treatment-resistant depression. It doesn't target mania, and it requires a hospital, anaesthesia and cost, and can cause some memory loss. rTMS is non-invasive and has reduced depressive and, in a few cases, manic symptoms, but it is early-stage; be cautious of commercial clinics without research ties.

3. Don't count on psychedelics or cannabis for mania

Psilocybin (studied at Johns Hopkins, including by Matthew Johnson) shows promise for depression, but Huberman knows of no controlled trials for mania, and it is illegal in the US. Stanford clinicians told him cannabis doesn't treat either phase; at most it may help some people sleep.

4. Discuss inositol and omega-3s only as additions to treatment

Myo-inositol affects second-messenger signalling and membrane fluidity, as do lithium and omega-3s. Huberman personally takes 900 mg every third night or so for sleep, and notes that the 10–18 g doses used for OCD can upset the stomach. Any supplement for bipolar disorder belongs alongside, not instead of, psychiatric care.

The Biology of Taste Perception & Sugar Craving | Dr. Charles Zuker

Guest: Dr. Charles Zuker
Date: 2022-07-18 · Duration: 2:17:38
URL: https://www.youtube.com/watch?v=UChhXiFPRgg

KEYPOINTS

1. Detection and perception are separate steps

Zuker, a Columbia neuroscientist and Howard Hughes investigator since 1989, defines detection as tongue cells binding a sugar molecule, before anything is perceived. Perception happens when the brain turns that electrical signal into meaning. He notes the brain is about 2% of body mass yet uses roughly 25 to 30% of the body's energy and oxygen. Because every brain encodes signals slightly differently, your experience of the same stimulus can differ from someone else's.

2. Five basic tastes, each with a built-in meaning

Sweet (energy), umami (amino acids and protein; examples are seaweed, tomatoes, cheese and MSG) and low salt (electrolytes) are innately attractive. Bitter (likely toxins) and sour (likely spoiled or fermented food) are innately aversive. You are born liking sweet and disliking bitter. Flavor is a broader experience combining taste with smell, texture, temperature and appearance.

3. Fat and metallic may not be true tastes

Zuker says much of what we call fat taste is probably mechanosensory: cells sensing fat rolling over the tongue rather than a dedicated taste receptor. Metallic taste, like a penny or blood, may be a particular ratio of activity across the existing five lines, the way pressing several piano keys produces a chord.

4. The tongue map is a myth

Each taste bud holds around 100 receptor cells, and Zuker's lab, which identified receptors for all five tastes (sour most recently), found that virtually every taste bud in the mouth contains all five types. Bitter receptors are somewhat enriched at the back of the tongue, a last line of defense that can trigger gagging before you swallow. The palate is rich in sweet receptors. He suggests the classic map likely came from mistranslated early data.

5. Taste identity and taste valence live in different brain areas

Sweet and bitter run as separate labeled lines from the tongue through the taste ganglia and brainstem stations to separate areas of taste cortex, in well under a second. Valence (whether it's good or bad) is imposed in separate amygdala targets for sweet and bitter. His lab has engineered mice that recognize sweet without finding it attractive.

6. Activating taste neurons directly creates the full experience

In mice, silencing sweet cortex neurons erased the perception of sugar. Activating bitter cortex neurons while the animal drank plain water made it gag as though tasting something bitter. In a place-preference test, mice sought out the side of a box where their sweet neurons were stimulated and avoided the side where bitter neurons fired, which shows these signals carry a felt positive or negative state and don't just drive licking.

7. Internal state rewrites what tastes good

Taste signals pass through several relays because each one lets hunger, thirst or depletion modulate the signal. Low salt is appealing and seawater is repellent, but salt-deprived animals find very concentrated salt (1 molar sodium chloride) highly attractive. Thirst suppresses hunger to conserve water: without water you'd die in about a week, while you can go without food for far longer.

8. Liking is the tongue, wanting is the gut

Mice without sweet receptors at first drink equally from sugar water and plain water. Within about 48 hours they drink almost only the sugar, finding the bottle by smell, texture or location. Cells in the intestine, not the stomach, sense glucose and signal the vagal (nodose) ganglion and brainstem that energy has arrived. Zuker calls this gut-brain signal the basis of our unquenchable desire for sugar.

9. Why artificial sweeteners don't end sugar cravings

Sweeteners activate the same tongue receptor as sugar, but the gut sensor is a different molecule that recognizes glucose, not sweeteners. Zuker believes that's why artificial sweeteners have failed to curb our appetite for sugar: they satisfy liking but never tell the brain sugar arrived. A goal for future research is finding ways to activate this circuit without sugar.

10. Processed foods hijack a deliberately slow system

The gut signal builds slowly, Zuker argues, so that in the wild an animal links its preference only to the richest, most reliable sugar sources after repeated exposure. Highly processed foods arrive pre-broken-down, activating these circuits on a timescale nature never produced and continually reinforcing wanting. He views obesity as a disorder of brain circuits rather than simply of metabolism.

EXAMPLES

1. Tangerine versus a sweetened tangerine extract

Even at equal calories, a whole tangerine and a processed tangerine extract spiked with sugar act very differently on the gut-brain axis. The fruit's sugar is bound up with fiber and long sugar chains that take real digestive work. The extract delivers ready-to-absorb sugar with no work at all.

2. Pavlov's dogs also released insulin

Beyond salivating at the bell, Pavlov's conditioned dogs released insulin to it. Zuker uses this to show the gut-brain axis runs both ways: brain associations can drive physiology in organs like the pancreas.

3. Acquired tastes and one-trial aversions

Beer and coffee overcome innate bitterness because the reward that follows (alcohol, caffeine) creates a positive association. Zuker grew up drinking wine in Chile and says that, at 19 in graduate school, he was too late to acquire a taste for beer. Conversely, one bad oyster can make you avoid oysters for months. Called conditioned taste aversion, this can even turn sugar aversive when it's paired with feeling ill.

4. Same salad, different price

Citing psychophysics experiments, Zuker describes identical 11-ingredient salads, one tossed together and one beautifully arranged. People will pay $8 for the arranged one rather than $2. He now eats red meat roughly once every four weeks, down from daily in Chile, and loves the presentation of sushi.

OTHER RELEVANT

1. Burnt tongues recover in two ways

Taste receptor cells live around two weeks and are constantly replaced, like gut lining cells. But recovery from a hot-tea burn within 20 to 60 minutes happens too fast for regeneration. It reflects damaged taste and somatosensory cells recovering function.

2. The vagus is thousands of separate channels

Zuker cautions that whole-nerve vagal stimulation, used for treatment-resistant depression and epilepsy, is like turning on every light in a stadium to find your keys: some effects help, but there's no specificity. Researchers including Harvard's Stephen Liberles are mapping individual vagal lines for heartbeat, breathing, stomach stretch and nutrients. Huberman adds that vagal stimulation can increase alertness, not only calm.

3. Reducing sugar gets easier

Huberman says that after initially restricting sweets, he has lost his appetite for them. Zuker attributes this to no longer reinforcing the sugar-wanting circuit, noting that most people are continuously exposed to highly processed foods and sugars, many hiding in plain sight.

Optimize & Control Your Brain Chemistry to Improve Health & Performance

Date: 2022-07-11 · Duration: 2:09:00
URL: https://www.youtube.com/watch?v=T65RDBiB5Hs

KEYPOINTS

1. Each sleep stage runs its own metabolism
Huberman opens with a Cell Reports study (first author Nora Nowak) that measured nearly 2,000 breath metabolites every 10 seconds through the night. Sleep states regulated more than half of them. The switch from sleep to waking lowered fatty-acid oxidation, slow-wave sleep raised it, and REM transitions shifted TCA-cycle intermediates. His takeaway is that full-length sleep, with slow-wave sleep early in the night and REM late, may tune daytime metabolism. Losing even an hour mostly cuts REM, which he says affects emotional stability and glucose metabolism.

2. Four neuromodulators set your brain state
Dopamine (motivation), epinephrine (alertness), acetylcholine (focus) and serotonin (well-being and satiety) change the likelihood that whole circuits fire. Their fast actions last seconds to about an hour, and their slow actions last hours to weeks, setting the baseline any tool works against.

3. The day has three neurochemical phases
In Huberman's framework, phase one (roughly 0 to 9 hours after waking) is when dopamine and epinephrine are at their highest. Phase two (about 9 to 16 hours) sees them fall while serotonin rises. Phase three (about 17 to 24 hours) should be sleep, with large organized swings in dopamine, serotonin and acetylcholine and little epinephrine. So a small push raises motivation in the morning, while getting focused at 9 pm takes stronger or combined tools.

4. Hormones tend to travel with particular neuromodulators
Painting broadly, Huberman says testosterone and dopamine tend to rise together in both sexes. Cortisol pairs with epinephrine, and oxytocin and prolactin pair with serotonin. Acetylcholine has no clear hormonal partner.

5. Morning sunlight and steady caffeine raise dopamine's effect
Early-day light to the eyes triggers dopamine release and, per a study he cites, increases expression of the DRD4 dopamine receptor gene. Regular moderate caffeine, about 100 to 400 mg a day, increases D2 and D3 dopamine receptors, separate from its immediate effects on alertness. Huberman cuts caffeine off around 2 pm and certainly by 4 pm, because it disrupts sleep architecture even when you can fall asleep.

6. Bright light at night suppresses dopamine
Citing Samer Hattar at the NIMH, Huberman says bright light of any color during phase three (roughly 10 pm to 4 am for a typical sleeper) activates a circuit involving the habenula that lowers dopamine. The effect isn't limited to melatonin, and it can carry into the next day. Keep middle-of-the-night lighting dim or off.

7. Movement, breathwork and cold release epinephrine
The locus coeruleus releases epinephrine across the brain, separately from the adrenals, and is tied to action in both directions: moving raises it, and its activity makes you want to move. Any exercise early in the day boosts energy for hours. Huberman suggests delaying caffeine 90 to 120 minutes after waking to blunt the afternoon crash. Cyclic hyperventilation (about 25 deep breaths, a brief breath-hold with lungs empty, repeated) reliably raises adrenaline, but people prone to anxiety or panic should be cautious.

8. Acetylcholine marks circuits for plasticity
Acetylcholine from the nucleus basalis highlights active synapses for later strengthening, and release from sites at the back of the brain filters which sensory signals reach awareness. He cites work from the labs of Michael Silver, Michael Merzenich and Michael Kilgard showing that raising acetylcholine before and during learning makes changes more likely to stick.

9. Serotonin's strongest behavioral levers are touch and gratitude
Physical contact with loved ones, including hugs, hand-holding, cuddling and petting a dog, increases serotonin transmission. On gratitude, Huberman says receiving it, and even watching others give and receive it, activates serotonergic circuits more than giving it. He calls these power tools rather than soft advice.

EXAMPLES

1. The 2019 night-owl reset trial
A randomized trial in Sleep Medicine had night owls wake and sleep 2 to 3 hours earlier, fixed within 15 to 30 minutes every day including weekends. They maximized outdoor light before noon, dimmed evening light, kept meal times consistent, had no caffeine after 3 pm, took no naps after 4 pm or longer than 90 minutes, and exercised in the morning. Participants reported less depression and stress and showed better reaction times and grip strength.

2. Cold water and sustained dopamine
Huberman cites the 2000 Šrámek study, in which sitting neck-deep in 60°F water for up to two hours produced long-lasting increases in dopamine and other catecholamines. He says later work suggests colder water (about 45 to 55°F) for as little as 30 seconds to a few minutes may also work. His guide is cold enough to be uncomfortable but safe, for 1 to 10 minutes, and ice isn't required. He notes Anna Lembke's patient who used cold exposure while coming off addictive drugs.

3. The cheese effect
Tyrosine-rich foods such as some meats and Parmesan support dopamine synthesis. People taking MAO inhibitor antidepressants who eat aged cheeses rich in tyramine can get migraines and spikes in blood pressure. Huberman uses it to show why anyone on dopamine-related medication should be careful.

4. Alpha-GPC, TMAO and garlic

Huberman takes 300 mg of alpha-GPC before training or work three to four times a week, often with caffeine and phenylethylamine. He notes that a few studies link long-term heavy use to higher stroke risk and says the data are still out. His blood work showed a rise in TMAO, and on a tip from Dr. Kyle Gillett, 600 mg of garlic (allicin) brought it back down.

5. 5-HTP versus myo-inositol

Huberman tried 5-HTP (people commonly take 300 to 500 mg) before bed twice. Each time he slept deeply for 1 to 3 hours, then woke and couldn't get back to sleep, so he dropped it. In contrast, 900 mg of myo-inositol 30 to 60 minutes before bed, taken every third night or so, has noticeably deepened his sleep and made it easier to fall back asleep. He contrasts that with the 5 to 18 g daily doses in human anxiety studies, where gut discomfort causes dropouts.

OTHER RELEVANT

1. Order of operations

Huberman's rule is behavior first, then nutrition, then supplements, then prescription drugs if there's a clinical need, under a physician. Don't throw every tool at a system at once. Keep a kit and use what fits the time of day and your goal. Talk to a doctor before changing supplements, especially if you take medication for depression or mania.

2. Dopamine supplements: how he uses them and what he avoids

He avoids Mucuna pruriens, which he describes as about 99% L-DOPA, because it causes a sharp crash afterwards. He uses L-tyrosine at most about once a week at 500 to 1,000 mg; it acts within 15 to 45 minutes and lasts roughly 30 minutes to two hours. Phenylethylamine at 300 to 600 mg is faster acting. He stresses that sensitivity varies widely. B6 can lower prolactin, but excess has been linked to peripheral neuropathy.

3. Simple focus and food tools

Stare at a visual target at your working distance for 30 to 60 seconds before a work session to narrow your attention. Choline sources include beef liver, eggs, beef, soy, chicken, fish, mushrooms and kidney beans. Tryptophan sources include turkey, whole milk, canned tuna, oats, cheddar, nuts, seeds and chocolate. He notes that post-feast sleepiness is mostly from overeating, not tryptophan.

4. Serotonin supplements need caution

Cissus quadrangularis at 300 to 600 mg increased serotonin by roughly 30 to 39% in an obesity study. Huberman says it may need cycling, and there's little good data on how. With anything serotonergic, watch for reduced appetite or libido, and never use supplements to replace prescribed SSRIs without your physician.

Optimize Your Exercise Program with Science-Based Tools | Jeff Cavaliere

Guest: Jeff Cavaliere
Date: 2022-07-04 · Duration: 2:40:47
URL: https://www.youtube.com/watch?v=UNCwdFxPtE8

KEYPOINTS

1. A 60/40 split between strength and conditioning
For general health with some muscle gain and leanness, Cavaliere, a physical therapist and strength coach behind ATHLEAN-X, suggests about 60% strength training and 40% conditioning. A simple week is lifting Monday, Wednesday and Friday with conditioning Tuesday and Thursday. He considers two conditioning sessions a week the bare minimum, and more is needed if cardiovascular performance is a priority.

2. Train long or train hard, but not both
Both men keep sessions to about an hour or less. Huberman does roughly 10 minutes of warm-up and 50 minutes of hard resistance work, plus 30 to 45 minutes for cardio sessions. He finds that going past about 60 minutes leaves him getting colds and weaker from session to session. Cavaliere says that as he's aged, workout length causes more problems than intensity, provided he warms up properly, which he now treats as an integral part of the session.

3. The best split is the one you'll stick to
Full-body, push-pull-legs (once or twice a week) and the "bro split" (one muscle group a day) can all work. A split you don't do isn't effective. Cavaliere notes the bro split helps people who need a few sets to lock in on how an exercise feels. Huberman's teenage split, given by Mike Mentzer, was shoulders and arms, two days off, legs, two days off, chest and back. Huberman now trains every other day because he wants to show up with fire.

4. Lift first, then do cardio
When conditioning and lifting share a day and lifting quality matters most, do the cardio afterward. Cardio before lifting impairs strength performance. Done fatigued afterward, it still taxes cardiac output. Two-a-days, such as pushing in the morning and pulling at night, can restore focus late in a workout but are impractical and systemically demanding for most people.

5. The Cavaliere cramp test predicts how well you can grow a muscle
If you can flex a muscle, such as the biceps or calf, so hard without load that it nearly cramps, you can likely stimulate it well under load. That intense contraction is the feeling to chase on each rep. Huberman says applying this made lagging body parts start growing. Cavaliere says the ability varies by exercise as well as muscle, and practice improves it.

6. Seek inefficiency for hypertrophy and efficiency for strength
For strength, let muscles work together, as chest, shoulders and triceps do in the bench press. For muscle growth, adjust the movement to make the target muscle work harder and feel more uncomfortable. If you don't feel it, something's off. Cavaliere says better neural connection also raises a muscle's resting tone, which he calls "muscularity."

7. Train external rotation of the shoulder
Daily life, sitting, and big muscles like the chest and lats pull the shoulder into internal rotation, while only small rotator cuff muscles rotate it externally. Reviewing a popular program, Cavaliere counted roughly 890 reps in a week and zero dedicated to external rotation. Add band external rotations. He swaps the upright row, which mirrors the Hawkins-Kennedy impingement test position, for a high pull with the hands rising above the elbows.

8. Much "back pain" starts elsewhere
A tight, weak gluteus medius can irritate the sciatic nerve and cause pseudo-sciatica that isn't from a disc. Cavaliere's fix, from what he calls his proudest video (30-plus million views): lie on your side, point the top toe down, press a thumb into the trigger point near the top of the glute, and lift the leg against the pressure. Huberman says repeating it a few times a day for three or four days resolved pain he'd thought was sciatica. Cavaliere notes it won't fix a genuine structural disc problem.

9. Grip in the palm to prevent golfer's elbow
On pulling exercises such as curls and chin-ups, the bar tends to drift into the fingertips, overloading the flexor digitorum superficialis (especially at the fourth finger), which attaches at the inner elbow. This is a common cause of medial epicondylitis, or golfer's elbow. Keep the weight deep in the palm, knuckles well over the bar. Huberman says this cured elbow pain he'd blamed on his triceps work.

EXAMPLES

1. Grip strength as a daily readiness check
With the Mets, Cavaliere's staff took grip baselines in spring training and retested every two or three weeks. At home, squeeze an analog bathroom scale. If your output drops by about 10% or more, consider skipping the gym that day. Huberman adds that grip strength follows a circadian rhythm, low at night and rising into the afternoon, so test at the same time each day.

2. Jump rope and landing
Progress from two-foot jumps to single legs, side-to-side hops and small twists to train all three planes. Aim to bounce off the balls of your feet. To feel why heel landing is bad, stand with toes raised and hop on your heels: your jaw will rattle, because heels have no shock absorption.

3. The plate method
Picture the plate as a clock showing 9:20, then draw a line to 12. The largest section is fibrous vegetables (broccoli, Brussels sprouts, asparagus). The next largest is protein, cooked to be enjoyable (Cavaliere gave up boiled chicken as a teenager).

The smallest is starchy carbs such as sweet potato, rice or pasta. Starches are the easiest to overeat, so controlling their portion matters most. As he puts it, nobody eats 10 chicken breasts.

4. Sheets and sleep position

Huberman untucked the sheets at the foot of his bed after hearing Cavaliere explain that tight sheets keep the toes pointed all night. Combined with tibialis work, this resolved his shin splints and running-related back pain. Cavaliere advises against stomach sleeping because it extends the lumbar spine, puts the arms overhead in internal rotation and cranks the neck.

OTHER RELEVANT

1. Stretching timing

Save passive stretching for later in the day, away from training or competition, because it temporarily disrupts the muscle's length-tension relationship and stored motor patterns. Cavaliere says muscles tend to heal shorter during overnight repair, so evening stretching may help. Before training, use dynamic moves like leg swings, butt kicks, walking lunges and toe touches.

2. Nutrient timing is flexible

Cavaliere says the strict post-workout anabolic window has been largely debunked, with refueling still beneficial three to five hours after training. Get protein either before or after, whichever doesn't hurt your session. He rejects "no carbs after 6 p.m." Huberman's pre-workout is good sleep, hydration, caffeine and music.

3. Kids and lifting

Cavaliere suggests around age 13, at puberty, to start adding external weight. Before that, and for any beginner, bodyweight work like lunges, pull-ups and chin-ups provides plenty of stimulus and builds control of the body. He also recommends tracking rest times and lifts, and staying off social media between sets.

The Science & Treatment of Obsessive Compulsive Disorder (OCD)

Date: 2022-06-27 · Duration: 2:33:35
URL: https://www.youtube.com/watch?v=OadokY8fcAA

KEYPOINTS

1. OCD is an itch that gets worse when you scratch it
Obsessions are unwanted, intrusive, recurring thoughts; compulsions are behaviors performed to relieve the anxiety they cause. The relief is brief and reinforces the loop, so the next obsession comes back stronger. Anxiety binds the two together. People with OCD usually know their fears are irrational, such as believing a left turn will cause a death, yet the urge feels overwhelming.

2. Common, debilitating and often hidden
Huberman cites estimates that 2.5% to perhaps 4% of people have true OCD, and says it ranks seventh among the most debilitating illnesses of any kind. The range is wide because many people disguise symptoms out of shame, using small hidden rituals such as tapping a thigh or counting silently. Most people with OCD never seek evidence-based treatment.

3. Three broad categories: checking, repetition and order
Checking includes returning to the stove or locks 20 or 30 times. Repetition includes counting sequences or, as bandmates described of Joey Ramone, walking a stairway a set number of times. Order covers symmetry, cleanliness and 'incompleteness,' a sense that something is not right and cannot be left. Many intrusive thoughts involve taboo, violent or sexual content, which deepens the shame.

4. A cortico-striato-thalamic loop is the core circuit
Imaging studies consistently show heightened activity in a loop linking the cortex, the striatum (which selects actions and holds them back, 'go' and 'no-go') and the thalamus, which gates what reaches awareness. Stimulating these circuits in animals produces compulsive grooming to the point of hair loss, and effective treatments reduce activity in the loop. Twin studies suggest roughly 40 to 50% of cases have a genetic component.

5. Exposure therapy works by raising anxiety, not lowering it
Unlike most anxiety treatment, cognitive behavioral therapy with exposure and ritual prevention guides patients, step by step, to articulate their deepest fear and face the trigger, whether real or imagined, then refrain from the compulsion while anxiety peaks. Patients learn anxiety can exist without the ritual. Huberman describes protocols summarized by Columbia's Helen Blair Simpson: two planning sessions, then about 15 exposure sessions at twice a week or more, with homework.

6. In head-to-head data, exposure therapy beat SSRIs
In a 12-week study (Foa and colleagues, 2005), placebo did nothing, while exposure therapy cut Y-BOCS severity from about 25 to about 11 by four weeks. SSRIs helped significantly but less, with gains from weeks four to eight. Starting both together added nothing over therapy alone, but adding exposure therapy for someone already on an SSRI improved symptoms further. Medication changes should go through a physician.

7. SSRIs help even though serotonin may not be the root problem
Options include fluoxetine, fluvoxamine, sertraline, citalopram and the less selective clomipramine. Yale's Christopher Pittenger notes in a 2021 review that serotonin is not clearly disrupted in OCD, but serotonin supports cognitive flexibility, and OCD involves rigidity. Real benefit often takes 10 to 12 weeks. For non-responders, psychiatrists may add a low-dose neuroleptic, which acts body-wide and can cause motor and other side effects.

8. Newer treatments remain unproven
Psilocybin has not yet matched its depression results in OCD. In a 2020 placebo-controlled study of 14 adults, smoked cannabis high in THC or CBD had little acute effect on OCD symptoms. Small ketamine studies show some relief in some patients. Transcranial magnetic stimulation over motor areas may help break the rapid obsession-compulsion pairing, with most excitement around combining it with therapy or medication.

9. Hormone patterns differ in OCD
A study of 30 patients and 30 controls found elevated cortisol and DHEA in women with OCD, and higher cortisol with lower testosterone in men. Huberman suggests both patterns could reduce GABA-mediated inhibition, though cause and effect are unknown and hormone-based treatments are untested.

EXAMPLES

1. Home visits expose hidden rituals
Because place-based conditioning makes symptoms return at home, clinicians may visit to see the faucet or towel that triggers rituals, and assign homework so gains made in the office carry over.

2. Myo-inositol and other supplements
A 2011 review found 5-HTP and tryptophan reduced symptoms somewhat like SSRIs, with similar potential side effects. Studies of inositol used very high doses, around 18 g a day, with some partial relief in as little as two weeks, though some participants quit due to stomach upset. Glycine trials used 60 g a day, which Huberman does not recommend outside a study. He personally takes 900 mg of myo-inositol for sleep.

3. Huberman's childhood grunting tic
Around age six or seven he felt compelled to grunt and hid in the car to do it. It faded within a year but resurfaces when he is exhausted, a reminder that transient tics in children are common.

4. Superstition on the path to compulsion
Rats and baseball pitchers both add irrelevant motions that happened to precede success. Repeated enough, such rituals

become automatic. People with OCD tend toward more superstitions; Huberman occasionally challenges himself not to knock on wood.

OTHER RELEVANT

1. Thoughts are not actions

Everyone has disturbing thoughts, like imagining jumping from a bridge. Recognizing that a thought does not equal a deed, and that the anxiety can be tolerated, is a cornerstone of recovery.

2. Do not call ordinary tidiness OCD

Obsessive-compulsive personality disorder lacks the intrusive quality; people often welcome their orderliness. If you can leave a pen cap crooked and move on, it is not OCD.

3. Mindfulness helps indirectly

Meditation sharpens focus, which could feed obsessions, but in Blair Simpson's research it seems to help mainly by improving engagement with therapy homework.

4. Ask for the Y-BOCS

The Yale-Brown Obsessive Compulsive Scale is the standard clinical measure; a score of 16 or higher indicates meaningful impairment.

The Science & Practice of Movement | Ido Portal

Guest: Ido Portal
Date: 2022-06-20 · Duration: 2:34:37
URL: https://www.youtube.com/watch?v=a9yFKPmPZ90

KEYPOINTS

1. Movements are containers; movement is the content
Portal separates specific movements, such as squats, push-ups or pirouettes, from the broader quality of being in motion. Exercises are like a cup handed to you with water in it: the point is to drink the water, not chew on the cup. A practice can start from any entry point, whether the spine, the pelvis, playfulness or a sport, as long as you keep asking whether you are collecting exercises or actually developing movement.

2. Movement practice begins with education and awareness
Before any technique, Portal wants people to notice that they live in a body that is always in motion, and that emotions and thinking move too. He describes three braided streams, action, emotion and thought, and says many practitioners never pay attention to how a movement feels. He borrows from Moshe Feldenkrais the view of a person as nervous system, mechanical body and environment together.

3. Discomfort is a marker that you are in the right place
Portal doesn't chase discomfort, but treats it as a gauge. If it is absent, you are probably just gratifying yourself; if it is so high you cannot make progress, you went overboard. Huberman adds the neuroscience: after a failed motor attempt, the forebrain enters a heightened state of focus for seconds to minutes, and the frustration of an error is the cue that primes the nervous system to learn from the next attempts.

4. Skill is a flexible 'sleeve', not a fixed pattern
Portal cites the Soviet movement scientist Nikolai Bernstein, who filmed workers swinging sledgehammers and found that accuracy at the hammer head improved while variation in the joints increased. The system self-adjusts to hit a stable result. Portal calls this a movement sleeve: many paths lead to the goal, and exploring that variety is what produces virtuosity. Huberman links it to Bence Ölveczky's work, where an expert's racket path in a tennis serve is highly consistent.

5. The deep squat is a resting position we have lost
Portal frames the squat not as a strength exercise but as a basic resting and working posture that chairs replaced. People also neglect overhead and behind-the-back positions, which he calls the 'back realm'. He notes anatomy varies: deeper or shallower hip sockets, femur shapes and Q angles make the squat easier for some populations than others.

6. Spinal waves may unlock more than mobility
Portal favours starting from the torso with dorsal, ventral, side-to-side, rotational and spiralling undulations, because big movements can mobilise some regions while others stay held. He says he has no evidence, only experience, that emotional material can be stored in tissue and released through spine work, echoing Ida Rolf's 'the issues are in the tissues'.

7. Train how you use your eyes
Portal argues that we don't move our eyes as well as we think, and that head and eye position lead whole-body movement. There is no single correct mode; sometimes vision should be soft and peripheral, sometimes tightly focused. He separates awareness from focus, which people often fuse, and uses the eyes as the easiest way into either state.

8. Linear gym movements are a narrow slice of what bodies do
Portal sees modern training, and even much modern yoga, as very linear, whereas traditional dances and martial arts are rounded and curved like movement in nature. He extends this to walking: swaying and coiling can help breathing pump naturally. Changing a single stance in the gym is a good start, but the value lies in continued examination rather than one new trick.

9. Touch and proximity are underused skills
He believes adults are touched too little and suggests many people join jiu-jitsu classes partly for contact. Learning to adjust how reactive you are to people close to you, and sometimes to switch reactivity off, matters for performance and clear thinking. Huberman notes that many people feel anxious in close face-to-face settings.

EXAMPLES

1. The squat challenge
Portal's prescription is to accumulate 30 minutes a day in an unloaded resting squat, spread through the day rather than in one sitting. You don't need to hold an upright torso. Build up gradually, since some people get hurt going too fast. He reports benefits for digestion, lower back, hips, knees and ageing in general, as a way of keeping the body's ability to fold.

2. Walking a crowded city as practice
Without a gym or nature nearby in Hong Kong, Portal would strap on a bag and spend two hours weaving through packed streets and escalators, trying not to touch anyone. It's a fully engaged, adaptive session that needs no equipment: 'the more low-tech are your tools, the more high-tech you are.'

3. Let kids fidget
Portal would make school chairs more mobile, not less, saying constant instructions to sit still remove self-discovery and can even hurt focus. Huberman recalls rolling his skateboard under his desk.

4. The stick-balancing honesty test
Anyone can balance a stick on a fingertip for 10 seconds, but holding it for 10 minutes exposes whether claimed focus holds up. For Portal, movement keeps self-assessment honest.

5. Counting to nine

Portal sometimes counts reps only to nine so people stay in the movement rather than mentally finishing at 10, a small example of leaving the process deliberately unfinished.

OTHER RELEVANT

1. Experiment with gait

Try different walks for different situations, such as entering a meeting or leaving a bad one, including approaching with the chin slightly down, and notice how each changes your state.

2. Thread movement through the day

Breath rhythm, how you get out of bed, or taking stairs playfully all count, alongside any dedicated session.

3. Approach practice as a researcher

Portal tries combinations, notices what he discovers and avoids forcing a predetermined answer, a humility he sees as central to progress.

Therapy, Treating Trauma & Other Life Challenges | Dr. Paul Conti

Guest: Dr. Paul Conti
Date: 2022-06-06 · Duration: 2:24:29
URL: https://www.youtube.com/watch?v=IOl28gj_RXw

KEYPOINTS

1. Trauma means an experience that overwhelmed your coping and left you different afterward

Conti draws a line between trauma and disappointments or bad memories. In the clinically useful sense, trauma changes how the brain functions, and you can see it in mood, anxiety, sleep, behavior, physical health and heightened vigilance. Simply remembering a cruel playground remark doesn't meet that bar. Trauma can be acute or chronic, and he says it underlies a large share of the depression, panic, addiction and poor choices he treats.

2. Guilt and shame usually follow trauma and push people to bury it

He describes shame as an 'aroused affect' that fires without our choice. In small ancestral groups it worked as a powerful deterrent, much as strongly encoded negative memories once helped people survive. In modern life, that same reflex makes people hide what changed in them, which is exactly backwards. Unlike in a viral pandemic, healing from trauma requires connection and putting words to what is happening inside.

3. The repetition compulsion is real

Conti says people who've been abused often end up in similar relationships or situations again. He explains this through the limbic system, which 'always trumps logic' when emotion is strong enough and 'does not care about the clock or the calendar.' The emotional brain tries to fix the past by replaying it in the present, so reproducing the original situation can feel like the path to relief.

4. Negative self-talk serves punishment, avoidance and a false sense of control

Huberman described imagining worst-case scenarios while driving. Conti named three drivers, 'and they're all bad.' The first is punishing yourself because trauma convinced you it was your fault. The second is distraction, since anger can feel better than guilt or shame. The third is the illusion that rehearsing disaster might prevent it. He calls these fantasies maladaptive signs of real brain change.

5. Short-term coping is fine, but it isn't resolution

Steering your thoughts away from something so you can fall asleep or get through a workday is a legitimate short-term strategy. If the past keeps dominating the present, though, real change means facing the material directly. Conti notes that people often try to change the past in order to control the future, and in the process stop living in the present.

6. Healing needs a 'de novo' perspective from outside your own loop

Conti says he's struck by how many intelligent, empathic people have had the same thought running in their heads for years. Our brains don't spontaneously notice that they've been spinning their wheels. Fresh perspective can come from a trusted person, from writing, or simply from knowledge about how trauma works.

7. Rapport is the single biggest factor in choosing a therapist

Conti puts it this way: if you list the top 10 factors in finding a therapist, 'just repeat rapport 10 times.' That means real attention, trust, and someone invested in your getting better. Modality still matters, but the best therapists aren't 'pigeonholed' into psychodynamic, CBT or DBT. They adapt to what the person needs. Therapy that always feels pleasant probably isn't touching the hard material.

8. Medication is overused when it replaces understanding

Conti says 15-minute visits weeks apart lead to 'polishing the hood when there's a problem in the engine.' He estimates the US uses roughly five times as much psychiatric medication as the Dutch. Some diagnoses, including bipolar disorder, OCD and true ADHD, nearly always warrant medication alongside therapy. More often, he sees medication as a way to help someone engage in therapy. Antidepressants raise distress tolerance, and some low-dose antipsychotics can quiet clinical rumination.

9. Not all attention problems are ADHD

Stimulants like Adderall, Ritalin and Vyvanse work very well for genuine ADHD. Conti notes that people who truly have it generally tolerate stimulants well. But anxiety, depression, poor sleep, poor diet, stress and trauma can all impair attention. In people without ADHD, long-term stimulant use can affect judgment, physical function and vigilance.

10. Psychedelics and MDMA work differently and both require clinical guidance

Conti calls the academic data on psilocybin and LSD 'powerfully positive.' His conjecture, which he labels as such, is that they quiet chatter in the outer cortex, where much of our survival-driven rumination happens. MDMA, by contrast, floods the brain with dopamine and serotonin. That makes it more permissive to approach trauma without guilt and fear, but the state has to be guided toward working through something, not just feeling good.

EXAMPLES

1. Conti's own turning point

In his early twenties, Conti's younger brother died by suicide. He describes hiding guilt and shame, losing his belief that hard work could make a difference, and feeling the world was against him. Only when his self-care visibly broke down and people around him stepped in did he recognize that he had changed and get help.

2. The rock in the shoe

While teaching physicians, Conti told a clinical anecdote that schoolchildren would recognize as someone with a rock in their shoe who can't concentrate. Several physicians answered 'ADD.' He uses the story to show how reflexively medicine reaches

for a prescription instead of finding the cause.

3. Intensive therapy

Conti says that if therapy happens less than once a week, too much of each session goes to catching up, so an hour weekly is the minimum for real progress. His practice offers about 30 clinical hours in a week across five or six clinicians, which he estimates is worth about 60 conventional hours.

4. Huberman's MDMA trial sessions

As a clinical trial participant, Huberman found his first session full of relational insights and his second mellow and centred on acceptance. Without guidance, he said, he could have fixated on something like how wonderful water is. Conti agreed that this suggestibility is why clinical structure matters.

5. Alcohol and cannabis

Conti says the number of times he has seen alcohol used well for coping 'approaches zero.' Some people, more often of Northern European ancestry, have a strongly euphoric response that raises the risk. Cannabis narrows attention, which can help some people relax or fall asleep, but under high distress it can narrow focus onto the very thing that is upsetting them.

OTHER RELEVANT

1. Journal when the thought shows up

Keep a journal with you and write when the painful thought arrives. Reading your own words back creates distance, almost as if the story belonged to someone else. That makes room for compassion and logic, including realizations like 'I started thinking this way after that happened.'

2. Interview therapists like job candidates

A therapist your insurance assigns is not the one you're stuck with. Word of mouth from someone you trust raises the odds of a good fit. Try a few sessions, judge on rapport, and expect the work to be hard, sometimes excruciating.

3. Find your own before-and-after routine for sessions

Conti says there's no universal routine for therapy. Some people arrive early and meditate, some take notes or walk afterward to consolidate insights, and others need to set it aside and reflect later. The goal is to be fully present during the session and keep what you gained.

4. Get the basics right first

For Conti, self-care is simple but not light: enough sleep, decent food, natural light, and people who are good to you. No amount of vacations or treats makes up for missing these foundations.

The Science & Process of Healing From Grief

Date: 2022-05-30 · Duration: 2:06:47
URL: https://www.youtube.com/watch?v=dzOvi0Aa2EA

KEYPOINTS

1. Grief is a motivational state, not just sadness
Huberman frames grief the way modern researchers do: as yearning for something just out of reach. He likens it to reaching for a glass of water when you are desperately thirsty, only to have it shift just beyond your grasp every time. That anticipation of action that leads nowhere is part of why grief hurts physically, not only emotionally.

2. Grief and depression overlap but are distinct processes
Both can bring loss of appetite, poor sleep and sudden crying. But grief rarely responds well to antidepressants, while depression often does. The adrenaline–complicated-grief link described below is not seen in depression either. Huberman repeats that the two can coexist but involve separable brain circuits.

3. Complicated grief affects roughly 1 in 10 people
Complicated (or prolonged) grief starts out like ordinary grief but fails to resolve even after a long time, to the point of impairing daily function. Huberman stresses that grief is a process with a beginning, middle and end. Validated questionnaires exist to distinguish complicated from non-complicated grief.

4. The five stages are useful, not gospel
Elisabeth Kübler-Ross described denial, anger, bargaining, depression and acceptance. Huberman notes that anger is already a motivated state and that bargaining overlaps with denial. Neuroimaging, deeper psychological evaluation and more clinicians in the field now show that stages blend, braid together and vary between people rather than proceeding in a fixed order.

5. Dopamine drives the craving in grief
Dopamine is about desire and pursuit, not feeling good. That applies to hunger, sex, addiction and, it turns out, loss. In grief the brain's reward and motivation circuitry, particularly the nucleus accumbens, is engaged alongside pain areas, keeping you in an anticipatory state of reaching for the person.

6. Relationships are mapped on three dimensions: space, time and closeness
An imaging experiment had people view objects at different distances, hear tones at different time intervals, and see faces that varied in physical distance and emotional closeness (a sister versus a stranger or celebrity). The same brain region tracked distance in all three. Huberman's model: deep attachment rests on a rich catalog of episodic memories that predict where and when you can next reach someone. Loss destroys the space and time parts of that map while the attachment remains.

7. Healthy grieving keeps the attachment but uncouples it from space and time
There is no adaptive reason to numb yourself or argue that the person mattered less. The task is to hold the full depth of the bond while no longer expecting past patterns to repeat. Huberman calls it spinning two plates at once, which is why it feels effortful and cognitively hard as well as emotionally hard.

8. 'Trace cells' may explain feeling someone's absence
Work from the lab of Nobel laureates Edvard and May-Britt Moser on navigation cells in the hippocampus and entorhinal cortex includes trace cells. These fire when something expected at a location is missing, like a coffee cone not in its usual spot. Huberman says there is reason to believe this circuit is very active soon after a loss, producing the sense that the person might walk through the door any moment.

9. Guilt and 'what ifs' strengthen the wrong connections
Counterfactual thinking ('if I'd called a day earlier') explores an infinite space you can never verify or refute. Psychologists describe this kind of guilt as granting yourself more control over reality than existed. It reinforces the bond to the old memory map rather than letting it reorganize.

10. Oxytocin receptor density may set how intensely you yearn
Monogamous prairie voles have far more oxytocin receptors in the nucleus accumbens than non-monogamous ones. In experiments they will press levers and even cross a shock plate to reach their partner. Human work suggests people with intense grief may likewise have more oxytocin receptors in craving circuits. Huberman's point: grieving at different rates is normal, with probable biological roots, and can cause friction within families.

EXAMPLES

1. 'Craving Love? Enduring Grief Activates Brain's Reward Center'
In this fMRI study by Mary-Frances O'Connor (University of Arizona), grieving people showed more activity in physical-pain regions than non-grieving people. Those with complicated grief also showed reward-related activity in the nucleus accumbens, evidence that grief includes wanting, not only pain.

2. Catecholamine predictors of complicated grief
In another O'Connor study, participants with the highest pre-treatment epinephrine (adrenaline) had the most complicated-grief symptoms after psychotherapy, independent of baseline symptoms. People who run more alert and anxious at baseline are statistically more likely to develop complicated or prolonged grief.

3. Writing about loss helped only people with high vagal tone
35 bereaved participants wrote about three times a week. One group wrote about the death, their deepest feelings and a letter to the person; controls wrote about how they spent their time. Overall there was no difference between groups.

However, people with high vagal tone (strong respiratory sinus arrhythmia) benefited from the emotional writing. Huberman calls it preliminary but influential.

4. Evening cortisol in complicated grief

'Diurnal Cortisol in Complicated and Non-Complicated Grief' found the same overall daily curve in both groups: cortisol rising after waking and peaking about 45 minutes later. But 4 p.m. and 9 p.m. levels were significantly higher in complicated grief. Huberman suspects the relationship runs both ways.

5. A phantom touch after his advisor's death

For years after his graduate advisor died, Huberman felt a touch on the back of his neck when he thought of her, though they never had such contact. The grief literature likens this to phantom limbs, which V.S. Ramachandran studied extensively.

OTHER RELEVANT

1. Schedule dedicated attachment sessions

Set aside 5–10 minutes, up to 30–45 if you can, to feel the closeness deeply while staying oriented to your present surroundings. During that time, avoid counterfactuals, replaying memories and imagining the person returning. Expect your mind to slip into expecting them; that is normal.

2. Match breathwork to how you grieve

Inhales speed the heart and exhales slow it. To build vagal tone, consciously slow your heart on long exhales and let it rise on inhales for 1–5 minutes a day. Huberman suggests this mainly for people who struggle to access their feelings. Those already overwhelmed by attachment may not benefit from amplifying the mind–body connection.

3. Lower baseline adrenaline before loss comes

Since high resting epinephrine predicts worse outcomes, stress-reduction tools can serve as a kind of inoculation against complicated grief, which matters for everyone, since everyone will eventually face a loss.

4. Protect sleep and the cortisol rhythm

View morning sunlight, dim lights and avoid bright screens in the evening, especially between 10 p.m. and 4 a.m. The rewiring involved in remapping happens during deep sleep and NSDR (10–30 minute non-sleep deep rest protocols). No single supplement or diet will speed grieving.

Understanding & Controlling Anger & Aggression

Date: 2022-05-09 · Duration: 1:30:53
URL: https://www.youtube.com/watch?v=RBK5KLA5Jjg

KEYPOINTS

1. Aggression comes in distinct types
Huberman distinguishes reactive aggression, when you feel threatened or protect people you love, from proactive aggression, a deliberate effort to harm. Indirect aggression is non-physical, such as shaming or verbally diminishing someone, especially in groups. Some aggression is adaptive, and the episode is about understanding and modulating it rather than eliminating it.

2. Aggression runs on dedicated circuits that fire as a pattern
Konrad Lorenz, the Nobel laureate famous for geese imprinting on him, showed that single stimuli can trigger whole 'fixed action patterns'. Walter Hess later lowered electrodes into the brains of awake cats. Stimulating one hypothalamic site turned a purring cat into a hissing, arched-back, hair-raised attacker of people and objects. It calmed within seconds when stimulation stopped, and this happened in every cat. Later human work confirmed such stimulation also produces subjective anger.

3. About 3,000 estrogen-receptor neurons in the VMH are necessary and sufficient for attack
David Anderson's lab at Caltech, in experiments led by Dayu Lin (now at NYU), used optogenetic tools developed by Karl Deisseroth and others. They activated estrogen-receptor neurons in the ventromedial hypothalamus of freely moving mice with light. Huberman says the work showed this tiny population is both necessary and sufficient for aggression.

4. Testosterone drives aggression mostly via conversion to estrogen in the brain
The enzyme aromatase converts testosterone into estrogen, which then binds those VMH neurons. Mice and humans lacking aromatase show less aggression despite high testosterone. Blocking aromatase prevents aggression no matter how much testosterone is given. Huberman calls this one of the most counterintuitive points of the episode.

5. Day length gates whether estrogen triggers aggression
Long, sunny days lower melatonin, raise dopamine and reduce cortisol. Under those conditions, raising estrogen experimentally doesn't provoke aggression; in short days it does. Huberman's explanation is that winter brings more melatonin, higher stress hormones (partly from more pathogen exposure) and less dopamine.

6. High cortisol and low serotonin lower the threshold for aggression
This is the 'hydraulic pressure' model: hormones, light, stress and substances add pressure toward aggression or release it. Serotonin signals contentment with what you have, and its precursor is tryptophan. Tryptophan-rich diets or supplements, and SSRIs such as fluoxetine, generally (not always) reduce aggressive behavior.

7. Testosterone acts fast on the amygdala, biasing toward effort
In a study Huberman describes, applying testosterone gel raised testosterone and activity in the corticomedial amygdala within 30 minutes. That's quick for a steroid hormone, which usually acts slowly through gene expression. The amygdala has both corticosteroid and testosterone receptors. Testosterone tilts it toward action, which is why Huberman says it 'makes effort feel good' rather than simply causing violence.

8. Testosterone correlates with competitiveness, with heavy caveats
One salivary testosterone study ranked six male occupations from lowest to highest: ministers, salesmen, firemen, professors, physicians, NFL players. Huberman warns the causal direction is unknown, saliva is a weaker measure than blood, and firemen's high-stress jobs may raise cortisol, which tends to push testosterone down.

EXAMPLES

1. From mating to attack at the flick of a light
Partway through mating with a receptive female, a male mouse whose VMH estrogen-receptor neurons were stimulated immediately stopped and tried to attack and kill her. The switch happened within seconds. When the light went off, he went back to trying to mate. Alone in a cage with an air- or water-filled rubber glove, a stimulated male attacked the glove as if it were another animal.

2. Female prisoners and violent crime
In studies of incarcerated women, higher salivary testosterone was associated with convictions for violent rather than non-violent crimes. Women with even one aggressive prison rule violation had higher testosterone than those with none. Huberman says prisons differ widely in baseline violence, so the findings should be taken with a grain of salt.

3. Caffeinated alcohol and indirect aggression
A 2016 study in Addictive Behaviors surveyed people aged 18–47 on a college campus. Participants averaged about 9.2 non-caffeinated drinks a week, with some up to about 20 total and nearly 8 caffeinated alcoholic drinks. More alcohol predicted more indirect aggression. Caffeinated alcoholic beverage use was linked to indirect aggression even after accounting for typical alcohol use and dispositional aggression.

4. Acetyl-L-carnitine in children with ADHD
A randomized, double-blind, placebo-controlled crossover study gave 6–13-year-olds 100 mg/kg per day (maximum 4 g), split into two doses after meals, over 24 weeks. Blood carnitine rose. Total problem scores, attention problems, delinquency and aggressive behavior all dropped significantly. Huberman notes the sample was small and needs replication; there is no objective biomarker for ADHD.

5. Omega-3s and mood

Huberman cites double-blind placebo-controlled studies in which 1–3 g a day of omega-3s improved mood on par with some SSRIs. Getting above about 1 g of EPA specifically has let some people take lower SSRI doses. He stresses that you should never stop a prescribed SSRI on your own, but discuss it with your doctor.

OTHER RELEVANT

1. Get daylight, especially in winter

View as much sunlight as you safely can, starting early in the day, and avoid bright light at night. This keeps melatonin, dopamine and cortisol in the profile in which estrogen is less likely to drive aggression.

2. Lower cortisol with heat

Huberman suggests sessions of about 20–30 minutes in a sauna (he cites 80–100°C) or a hot bath at a temperature that won't burn you. He refers to his heat episode for details.

3. Ashwagandha, only in short cycles

Huberman calls it a potent cortisol reducer that may help during an irritable stretch. Because chronic use can disrupt other hormone and neurotransmitter pathways, he suggests about two weeks on, then two weeks off. Check with your doctor first.

4. Skip energy-drink cocktails

If you want to be less reactive, cut alcohol overall and especially caffeinated alcoholic drinks, which carried an aggression risk beyond alcohol itself.

5. Combine several small levers

No single supplement or habit flips someone from aggressive to calm. Huberman's approach is to stack levers that each relieve some 'hydraulic pressure': light, heat, diet (tryptophan, omega-3s), substance choices, awareness of competitive work settings, and an understanding of your own hormone context.

Micronutrients for Health & Longevity | Dr. Rhonda Patrick

Guest: Dr. Rhonda Patrick
Date: 2022-05-02 · Duration: 2:49:33
URL: https://www.youtube.com/watch?v=XcvhERcZpWw

KEYPOINTS

1. Small, intermittent stressors switch on protective pathways
Patrick, a biomedical scientist, frames plant compounds, cold, heat and exercise as hormetic stressors: brief challenges that activate the body's own repair and antioxidant programs. She credits Dr. Mark Mattson with the phrase 'intermittent challenge'.

2. Sulforaphane activates Nrf2 and glutathione
Sulforaphane from cruciferous vegetables activates the transcription factor Nrf2, turning on detoxifying genes, including those that make glutathione, a major antioxidant. Patrick cites human evidence of raised glutathione in plasma and brain, and of lower DNA damage in white blood cells. Studies in polluted regions of China showed increased excretion of benzene, an airborne carcinogen. She notes broccoli sprouts carry up to 100 times more sulforaphane than broccoli.

3. Cooking cuts sulforaphane, but mustard seed restores it
Sulforaphane forms when the heat-sensitive enzyme myrosinase acts on glucoraphanin in broccoli. A study found that adding 1 gram of ground mustard seed powder, which contains myrosinase, to cooked broccoli boosted sulforaphane about fourfold. It should have a little kick; if it doesn't, the powder is likely expired.

4. EPA omega-3s may help mood by countering inflammation
Patrick describes a placebo-controlled study in which injecting endotoxin (lipopolysaccharide) caused depressive symptoms, and about 2 g of EPA beforehand blunted them. Huberman takes about 2 g of EPA a day, citing comparisons of 2–4 g daily with SSRIs. Both stress that depression treatment should not be self-managed.

5. The Omega-3 Index tracks long-term status
Bill Harris's Omega-3 Index measures omega-3 in red blood cells, which turn over about every 120 days. That makes it a long-term marker, unlike standard plasma tests that reflect recent meals. Americans average about 5%, the Japanese around 10–11%. In Framingham data, an index of 4% or below was associated with about five years' shorter life expectancy than 8%. Smokers with high levels had life expectancy similar to non-smokers with low levels; these are observational findings.

6. Krill oil absorbs well but is impractical
DHA in phospholipid form, as in krill, is more bioavailable and reaches the brain through the MFSD2A transporter. Patrick says this may matter for APOE4 carriers (about 25% of people, with roughly double the Alzheimer's risk for one copy). But krill supplements are low-dose and often rancid, and the body can make phospholipid DHA from triglyceride forms, so she favors about 2 g or more of fish oil.

7. Test vitamin D, because response varies
Common gene variants impair vitamin D conversion. Mendelian randomization studies link genetically low vitamin D to higher all-cause, cancer and respiratory mortality and to multiple sclerosis. Typically, 1,000 IU raises blood levels about 5 ng/mL, so moving from 20 to 40 ng/mL needs at least 4,000 IU. Patrick takes 5,000 IU and sits around 50 ng/mL; she says toxicity requires very high doses over a long time. Exposed skin area matters for producing it from sunlight.

8. Magnesium insufficiency may quietly impair DNA repair
Patrick says about 40% of Americans are insufficient. Magnesium is needed to make and use ATP and is a cofactor for DNA repair enzymes, so the damage is invisible. It sits at the center of chlorophyll, so dark leafy greens like kale, spinach, chard and romaine are her main source. She supplements around 130–135 mg at a time to avoid gut upset and prefers malate. Huberman uses threonate or bisglycinate 30–60 minutes before bed.

9. Regular sauna use is linked to large drops in disease risk
In Jari Laukkanen's Finnish cohorts, using a sauna 4–7 times a week, compared with once, was associated with more than 60% lower dementia and Alzheimer's risk. In men it was linked to about 50% lower cardiovascular mortality. Sessions needed to be more than 19 minutes at about 174°F, while 11-minute sessions showed only about an 8% reduction. Patrick argues the dose-response pattern strengthens a causal case, and notes that sauna mimics moderate cardio in its effects on heart rate and blood pressure.

EXAMPLES

1. Patrick's broccoli and moringa routine
She lightly steams broccoli, adds butter and mustard seed powder, and adds a heaping tablespoon of moringa powder, which Jed Fahey's research suggests activates Nrf2 similarly, to smoothies.

2. Short, cold plunges
She uses three minutes at 49°F, mainly before talks or when anxious. Huberman cites a 2000 study in which an hour at about 59°F produced long-lasting rises in plasma dopamine. Repeated cold 'browns' fat via norepinephrine, PGC-1; æB T5 à Patrick warns that going straight from a 30-minute, 104°F hot tub into cold water made her lightheaded, so she now waits a few minutes between.

3. Studying in the sauna
Patrick rehearses talks in the heat. Huberman links this to James McGaugh's inverted-U relationship between adrenaline and memory. She also hypothesizes that dynorphin released during heat stress sensitizes the brain's mu-opioid receptors, boosting later feel-good endorphin effects.

4. Hot-bath alternative

Studies typically use about 104°F for 20 minutes from the shoulders down, which raises heat shock proteins and BDNF. Local heat prevented nearly 40% of disuse muscle atrophy in one study. Heat lowers sperm count and motility, which Patrick says recovers after about six months without exposure.

OTHER RELEVANT

1. HIIT builds new mitochondria

Patrick cites Matthew Robinson's study showing large increases in mitochondrial biogenesis from high-intensity interval training, especially in older adults. She sees fresh mitochondria as an anti-aging lever.

2. Get the right test

Ask for an Omega-3 Index rather than plasma omega-3, and retest vitamin D (25-hydroxy) after starting supplements. Check with your physician before changing supplements.

3. Know what kind of evidence you trust

Huberman notes that people differ in whether they will act on mouse data or only on human trials. Patrick takes magnesium threonate on promising animal data while acknowledging the human results are thin.

Using Light (Sunlight, Blue Light & Red Light) to Optimize Health

Date: 2022-04-18 · Duration: 2:23:43
URL: https://www.youtube.com/watch?v=UF0nqolsNZc

KEYPOINTS

1. Light shapes the body through two routes: eyes and skin
Huberman explains that wavelength determines what light does. Short wavelengths such as UVB and blue strongly drive melanopsin-containing retinal ganglion cells. Long wavelengths such as red and near-infrared penetrate deeper into skin and reach cellular structures like mitochondria. Nature rarely relies on a single mechanism, so many effects of light, including on hormones, pain and mood, run through both the eyes and the skin.

2. Melatonin translates day length into a body-wide signal
Light hitting the eyes signals the pineal gland, deep in the brain, to stop releasing melatonin. Long summer days therefore mean a shorter nightly melatonin signal, and winter a longer one. Endogenous melatonin has regulatory effects: it promotes bone-building osteoblasts, suppresses gonad maturation (one reason high childhood levels delay puberty), affects placental development, and regulates sleepiness. It also has protective effects as an antioxidant and immune activator. Huberman stresses that the benefit comes from its daily and seasonal rise and fall, not from simply having more.

3. Protect your nighttime melatonin
Bright overhead light in the middle of the night drives melatonin to near zero almost immediately. If you get up, use the minimum light needed to move safely, ideally dim amber or red light, which barely affects the melanopsin cells unless very bright. Shift workers should keep their sleep period dark too. Huberman is cautious about melatonin supplements, saying most doses are supraphysiological and flatten the natural seasonal rhythm. Anyone pregnant should talk to their doctor before taking it.

4. Sun on the skin raised sex hormones in a 2021 study
Huberman reviews a 2021 Cell Reports paper, "Skin exposure to UVB light induces a skin-brain-gonad axis and sexual behavior." In mice, UVB raised testosterone and estrogen, increased mating and gonad size, and improved follicle maturation. In humans, after a few days of covering up to set a baseline, UVB exposure raised estradiol, progesterone and testosterone in both sexes and increased romantic passion, sometimes after just one or two sessions. Measured across a year, testosterone was lowest in winter and highest from June to September. Testosterone rose more in men from countries with low UV exposure, which parallels darker skin needing more sun for vitamin D3.

5. Bright light reduces pain through the eyes and skin
UVB on the skin increases beta-endorphin release. A recent Neuron paper found that light captured by melanopsin cells in the eye signals the ventral lateral geniculate and intergeniculate leaflet, which drive the periaqueductal gray to release endogenous opioids. This helps explain why people tolerate physical and emotional pain better on long, bright days.

6. UVB to the eyes primes immune defenses
Sufficient UVB to the eyes activates a sympathetic nervous system pathway that makes the spleen deploy immune cells and molecules. Huberman argues that fewer summer colds reflect better defenses as well as warmer weather. Wound healing is faster with more UVB, and a PNAS study showed that light on melanopsin cells helps drive stem-cell turnover in skin, hair and nails, which grow faster on longer days.

7. The right light at the wrong time worsens mood
Citing Samer Hattar of the National Institute of Mental Health, Huberman recommends getting as much light in your eyes and on your skin early and throughout the day as is safely possible. But a melanopsin pathway to the perihabenular nucleus bypasses the body clock, and activating it at night reduces dopamine and can promote low mood. He advises avoiding artificial bright or UV-rich light from roughly 10 p.m. to 4 a.m., and from 8 p.m. if you're prone to depression.

8. Even dim light during sleep affects the heart and metabolism
In a study he describes, healthy adults slept a full night in either under 3 lux or about 100 lux of overhead light. Melatonin was unaffected in both groups. But the 100-lux sleepers had higher nighttime heart rate, lower heart rate variability and greater insulin resistance the next morning. He suggests a free light-meter phone app to gauge your bedroom's brightness.

9. Red light reaches mitochondria
Red and near-infrared light can enter cells and boost mitochondrial ATP production while lowering reactive oxygen species, which build up with age. That's the mechanism behind evidence-backed low-level light therapy for acne, scarring, wound healing and pigmentation, which is usually applied to targeted patches of skin. Huberman notes there are few data on whole-body red light and that most infrared saunas don't get hot enough to produce sauna's established effects.

EXAMPLES

1. Glen Jeffery's red light vision studies
In two human studies from Glen Jeffery's lab at University College London, people aged about 28 to 72 viewed 670 nm red light, with 790 nm near-infrared also used, from about a foot away for 2 to 3 minutes each morning, over periods ranging from two to twelve weeks. Only those 40 and older improved, with about a 22% gain on the tritan test of short-wavelength cone function and reduced drusen (fatty deposits in the eye). Huberman says rods and cones are the body's most metabolically active cells.

2. The UVB protocol used in the hormone study
Subjects spent about 20 to 30 minutes outdoors around midday, two or three times a week, in short sleeves or shorts with no hat or sunglasses, going about normal activities, for 10 to 12 sessions over about a month. Huberman suggests the same pattern for chronic pain where it's safe.

3. Huberman's own light setup

He gets outside early and several times a day, keeps a roughly 930 to 1,000 lux LED drawing panel on his desk year-round, and looks at it more on overcast days. He says it's a much cheaper option than a typical SAD lamp.

4. 40 Hz flicker for the brain

Li-Huei Tsai's MIT group found that light flickering at 40 Hz entrains gamma oscillations across the brain, reducing amyloid plaques and phosphorylated tau and supporting synapses. These studies are now in clinical trials for Alzheimer's. Huberman considers home protocols premature and warns that flicker can trigger seizures in people prone to epilepsy.

OTHER RELEVANT

1. Make daytime exposure count

Cloudy daylight still delivers far more light than indoor sources. Glasses and contacts are fine, but windows and windshields filter UVB. Don't wear blue blockers outdoors or during the day. Never look at any light that is painful to view. People with retinitis pigmentosa, macular degeneration, glaucoma or a high skin cancer risk should consult their ophthalmologist or dermatologist first.

2. Using red light safely

For eyes, use a dim, non-flashing source at a distance that doesn't make you squint. Many commercial panels are too bright for close viewing and come with eye shields. Check with an eye doctor before starting. For late-night work, a study on shift workers found dim red light promoted alertness without suppressing melatonin or raising cortisol. The study compared it with 460 nm blue light and dim white light.

3. Systemic exposure beats spot treatment

Huberman argues light therapies that illuminate broad areas of skin, combined with appropriate light to the eyes, are likely more potent than a small local device. He warns never to shine high-intensity skin devices into the eyes.

Dr. Andy Galpin: How to Build Strength, Muscle Size & Endurance

Guest: Dr. Andy Galpin
Date: 2022-03-28 · Duration: 3:31:28
URL: https://www.youtube.com/watch?v=IAnhFUUCq6c

KEYPOINTS

1. Exercise produces about nine distinct adaptations, and fat loss is not one of them

Galpin lists skill, speed, power, strength, hypertrophy, muscular endurance, anaerobic power (roughly 30 seconds to 2 minutes), VO2 max (about 3 to 12 minutes) and long-duration endurance (30+ minutes without a break). Fat loss is a byproduct rather than a trainable quality. Some of these carry over to each other (power is strength multiplied by speed), while others compete, so pushing one hard can cost you another.

2. Every adaptation depends on progressive overload

Adaptation is a response to stress, so repeating the same Monday-Wednesday-Saturday routine indefinitely will maintain fitness but won't improve it. Overload can come from more weight, more reps, more frequent sessions, more movement complexity, or a bigger range of motion. Galpin stresses that the core concepts are few and the methods are many.

3. Default to taking every joint through its full range of motion across the training week

Galpin says the research fairly consistently shows larger ranges of motion improve both strength and hypertrophy, and they also reduce injury. The caveat is that full range is a target, not a licence for bad technique. If reaching depth in a deadlift means rounding your lower back, shorten the range and keep the spine neutral.

4. Strength training means heavy loads, few reps and long rests

Because of Henneman's size principle, high-threshold fast-twitch fibres only get recruited when the muscle has to produce a lot of force. For moderately trained people, that means roughly 85% or more of your one-rep max (about 75% can work for less-trained lifters), five reps or fewer per set, and 2 to 4 minutes of rest between sets so fatigue doesn't cut into intensity. Keeping fast-twitch fibres matters for aging, because they're the ones lost first.

5. Beginners respond to almost anything

In Galpin's lab, untrained subjects doing just 30 minutes of cycling gained muscle strength and size. Specificity, meaning that what improves reflects what you demanded, only becomes important once you're past the beginner stage. That's when 'imposing a demand of strength, not repetitions' starts to pay off.

6. Hypertrophy is forgiving on reps but strict on effort

Anywhere from about 5 to 30 reps per set produces broadly similar muscle growth in the research, with 8 to 30 roughly equally effective. The non-negotiables are taking sets close to muscular failure and recovering enough for protein synthesis to happen. He cites recent meta-analyses suggesting a minimum of about 10 working sets per muscle group per week, and suggests rotating rep ranges simply to keep training interesting.

7. Muscle growth has three likely drivers, and any one can be enough

The three candidates are mechanical tension (heavy loads), muscle damage and metabolic stress (the burn). Galpin says the mechanisms are still a 'guessing game.' Metabolic stress probably explains why very light blood flow restriction training still builds muscle. More soreness isn't better, and a little is only a rough proxy.

8. Endurance work should start with concentric-dominant exercise

Running is a series of single-leg eccentric landings, so jumping straight back into 25-minute jogs often leads to sore quads, shin splints and knee or back pain from compensating. Galpin suggests building endurance first with cycling, swimming and similar low-eccentric work, then adding running once the tissue can handle it.

9. Hit maximum heart rate about once a week

Galpin doesn't count conversational-pace movement as exercise, though it's still essential: walk while you take calls, pace around. He recommends one session a week that reaches near-maximal heart rate, which takes at least about 30 seconds of all-out work (e.g. a bike sprint or 90 seconds of burpees). His reasoning is specificity: stroke volume, cardiac output, endothelial function and mitochondrial adaptations only get pushed if you push them. He calls the 220-minus-age formula a rough guide only; his own max is close to 210.

10. Sodium bicarbonate and beta-alanine buffer the acid that drives fatigue

Galpin explains that fatigue usually reflects a pH signal long before you run out of fuel or oxygen, because enzymes stop working well outside a narrow pH range. Bicarbonate buffers that acid, and beta-alanine is stored as carnosine, which buffers inside the muscle. He calls both cheap, safe and well studied for repeated high-intensity efforts.

EXAMPLES

1. The '3 to 5' strength and power template

Do 3 to 5 exercises for 3 to 5 sets of 3 to 5 reps, rest 3 to 5 minutes, and train 3 to 5 days a week. That ranges from a 20-minute session (3×3 of three exercises, three times weekly) up to 5×5 of five exercises, five days a week. For strength, use 85%+ of your max. For power, use roughly 40–70% and move fast.

2. The Galpin equation for hydration

Research suggests about 2 ml of fluid per kg of body weight every 15 minutes during exercise. Galpin converts this to body weight in pounds divided by 30, in ounces, every 15–20 minutes. A 200-lb person would drink about 6.5 oz. He also suggests about 500 mg of sodium before and after training (more for salty sweaters), and notes Himalayan salt is relatively low in sodium. The gut can be trained to tolerate fluid while running.

3. Ice baths straight after hypertrophy training

Galpin, who calls himself a big believer in cold water immersion, says getting into ice right after a hypertrophy session is 'getting pretty close to you just shouldn't have done the session.' He estimates roughly 10% blunted growth, more in some individuals. He suggests waiting about 4 hours, a figure he admits is theoretical, or doing cold before training. Cold showers are a much weaker stimulus.

4. Heat after training

A handful of studies suggest about 20 minutes of sauna after hypertrophy work may augment growth, possibly through increased blood flow, though he says there's no established dose for time or temperature. A hot bath is the next-best option. He warns against assuming a 300% rise in growth hormone translates into more muscle.

OTHER RELEVANT

1. A simple balanced session

Pick one each of an upper-body press, upper-body pull, lower-body push (squat, lunge) and lower-body hinge (deadlift, RDL), covering both horizontal and vertical pushing and pulling over the week. Warm up in ramps, for example 10 reps at 50%, 8 at 60%, 8 at 70% and 5 at 75%, before your working sets.

2. Train strength at least twice a week per muscle

Galpin says twice per week per muscle is a good minimum for getting most people strong, and three is great. Daily training is possible but unnecessary unless strength is your job.

3. Downregulate for five minutes after training

His athletes finish every session with breathing and dimmed light, lying on their backs if possible. Use exhales about twice as long as inhales (e.g. 4 seconds in, 8 out) or box breathing. Huberman reports that adding this improved his recovery between workouts. During lifts, Galpin says bracing matters more than when you exhale.

4. Creatine is the standout supplement

Galpin calls creatine monohydrate the 'Michael Jordan' of supplements: cheap, safe and effective across many domains, with much of the research now clinical, including brain and mood. He's explicit that it is not a cure for depression. Huberman takes 5 g a day, mainly for cognition.

5. Watch total stress against recovery capacity

Galpin frames recovery as visible stressors plus hidden stressors set against recovery capacity. When stress outpaces recovery, you regress. Morning grip strength and a CO2-tolerance exhale test are tools his group uses, with CO2–anxiety findings still unpublished at the time.

Controlling Sugar Cravings & Metabolism with Science-Based Tools | Huberman Lab Podcast #64

Date: 2022-03-21 · Duration: 1:58:56
URL: https://www.youtube.com/watch?v=VAEzZeaV5zM

KEYPOINTS

1. Sugar acts on the brain through two main routes: its sweet taste and its nutritive effect on blood glucose
Huberman frames sugar seeking as hardwired parallel pathways, found in every mammal studied and even in fruit flies. One pathway responds to the perceived sweetness in the mouth; the other responds to how much a food raises blood glucose. Because sweet foods usually also raise glucose, a craving for cake is both a craving for the taste and neurons 'craving' the fuel that comes with it.

2. Ghrelin drives hunger and insulin clamps blood glucose to protect neurons
Ghrelin rises the longer it has been since a meal and acts on the hypothalamus to make you hungry, especially for sugary and fatty foods; eating suppresses it. Insulin keeps glucose from spiking, because very high blood sugar is toxic to neurons, which do not regenerate once they die.

3. Neurons prefer glucose, and astrocytes deliver it to them
Neurons are highly metabolically active and run mainly on glucose, which astrocytes, the brain's most abundant cell type, shuttle to them. Deliberate thinking and effortful, skilled movement raise glucose uptake, one reason focused work feels tiring. Huberman notes this does not mean more sugar improves brain function; many people report clarity while fasted.

4. Fructose is handled differently and can increase hunger, but whole fruit is not the villain
Fructose probably cannot directly access the brain and is converted to glucose in the liver. It suppresses the hormones that normally suppress ghrelin, so the net effect is more ghrelin and more hunger regardless of calories eaten. Fruit contains roughly 1–10% fructose versus about 50% (or more) in high-fructose corn syrup, so Huberman rejects the claim that fruit makes you fat; he does say people trying to control hunger may not want to eat a lot of fruit.

5. Sweet taste triggers dopamine and a pleasure–pain seesaw that pushes you to want more
Sweet tastes, especially sweet liquids, strongly release dopamine in the mesolimbic reward pathway, which drives pursuit. Drawing on Dr. Anna Lembke's 'Dopamine Nation', he explains that every dopamine rise is followed by activity in circuits for pain and lack. The longer you wait to indulge, the bigger the spike and the dip that follows, and a second bite never matches the first.

6. Gut neuropod cells drive sugar seeking below conscious awareness
Neuropod cells, discovered by Dr. Diego Bohorquez at Duke, sense sugar in the gut and signal via the vagus nerve and nodose ganglion to the nucleus of the solitary tract, triggering dopamine release whether or not you taste sweetness. That is why hidden sugars in salty foods like chips make you want more food in general.

7. A third accelerator comes from how neurons use glucose
Work from Dr. Dana Small's lab at Yale and others used PET imaging with 2-deoxy-D-glucose (2DG), which blocks glucose uptake by neurons. 2DG eliminated the preference for sweet foods, revealing a third parallel pathway. Huberman stresses 2DG is a lab tool, not something to take.

8. How fast glucose rises matters, so lowering the glycemic index blunts the dopamine signal
Glycemic index ratings are roughly below 55 (low), 55–69 (medium) and 70 or above (high), but they are measured with foods eaten alone. Fiber or fat slows the rise, which is why fatty ice cream can rank lower than mango. Using crack cocaine as a deliberately extreme analogy, he argues that the speed of the dopamine rise, not just its peak, drives the urge to repeat.

9. Flavors can be conditioned to trigger insulin, a controversial finding about artificial sweeteners
In human studies from Dana Small's lab, a flavor paired with maltodextrin (which raises glucose but has little taste) later raised insulin on its own, including the flavor of artificial sweeteners. The children's arm was stopped by the review board because of the insulin shifts. Huberman calls this unsettled and says he occasionally drinks diet soda himself.

10. Omega-3s and amino acids may substitute for sugar's gut signal
Neuropod cells respond to sugar, amino acids and essential fatty acids alike, and all three can trigger dopamine. This offers a plausible reason why EPA omega-3s or glutamine might reduce sugar cravings. Huberman is explicit that human studies have not confirmed this mechanism, and the effect of EPA could simply be calorie replacement.

EXAMPLES

1. Taste-blocked subjects still come to prefer sugar water after ~15 minutes
In sweet-receptor knockout mice and in people whose mouths are numbed, preference for sugary solutions over water initially disappears. After about 15 minutes it returns, even though the sweetness still cannot be tasted. Huberman uses this (a Frontiers in Bioscience paper with first author Freeman, among many similar studies) to show the post-ingestive pathway at work.

2. Huberman's mango habit
Despite little sweet tooth, he eats mango about twice a week, timed after resistance training or a hard run, when the body is better at using circulating sugar and replenishing glycogen.

3. Sugary drinks and ADHD meta-analysis
A systematic review and meta-analysis in Complementary Therapies in Medicine found that beyond about four 12-ounce sugary drinks per week, especially in kids, existing ADHD symptoms tend to worsen. Huberman says the data cannot show

that sugar causes ADHD, and the authors did not look at artificially sweetened sodas.

4. Lemon juice and a continuous glucose monitor

Tim Ferriss reported vinegar did not blunt his glucose. Huberman cites data, and his own continuous glucose monitor experiments, showing a couple of tablespoons of lemon or lime juice in water before, during or after a large meal blunts the glucose rise, likely partly because sour and sweet together activate distinct taste circuits (Charles Zuker's work at Columbia).

5. Berberine made him hypoglycemic

Taken on an empty stomach, berberine gave Huberman brutal headaches, dizziness and blurred vision because his blood glucose dropped too low. With a very large carbohydrate meal he tolerated 750 mg to 1 g without issue.

OTHER RELEVANT

1. Pair sweets with fiber or fat, and avoid sweet drinks

If you are going to eat something sweet, choose lower-glycemic options or eat fiber alongside to slow the glucose rise and the dopamine spike. Huberman, citing Dr. Robert Lustig's work replacing fructose with glucose at equal calories, singles out soft drinks, high-fructose corn syrup and sugary fruit juices as the main things to cut.

2. Cupboard tools: EPA, glutamine, lemon juice and cinnamon, with caveats

Huberman takes 1–3 g of EPA per day. Some people use several grams of glutamine a day split into 3–4 servings to blunt cravings; increase the dose gradually to avoid stomach upset, and he discourages it for anyone who has or is prone to cancer. Lemon or lime juice can cause hypoglycemia if you are fasted. Keep cinnamon (any real variety) to about 1–1.5 teaspoons a day because of coumarin toxicity.

3. Treat berberine like a prescription drug

He describes berberine as comparable in potency to metformin or glibenclamide. Typical doses studied are 0.5–1.5 g daily, and sodium caprate can enhance its effects. Talk to a doctor before using it, and avoid it on an empty stomach or a low-carbohydrate diet.

4. Sleep is the foundation for controlling sugar appetite

A Cell Reports study sampled sleepers' breath every 10 seconds and found each sleep stage has its own metabolic signature. Poor sleep is linked to stronger sugar cravings and shows up across obesity and type 2 diabetes data, though cause and effect are unclear. Huberman says to get quality sleep at least 80% of the time, or other tools are just 'rearranging deck chairs on the Titanic'.

Using Salt to Optimize Mental & Physical Performance | Huberman Lab

Date: 2022-03-14 · Duration: 2:03:54
URL: https://www.youtube.com/watch?v=azb3Ih68awQ

KEYPOINTS

1. Talk about sodium, not salt
About 40% of table salt by weight is sodium: one gram of salt contains about 388 mg of sodium. Guidelines and studies usually give sodium amounts, so Huberman converts between the two throughout the episode. For example, the U.S. recommendation of 2,300 mg of sodium is about half a teaspoon of salt.

2. The OVLT is the brain's salt and blood-pressure sensor
The organum vasculosum of the lateral terminalis (OVLT) is one of the few brain areas without a full blood-brain barrier, so its neurons can sample the blood directly. One group of neurons senses osmolarity, meaning salt concentration. Another group of baroreceptor neurons senses blood pressure. Huberman calls it so essential that if it fails, you are 'effectively dead or dead soon'.

3. Two kinds of thirst
In osmotic thirst, salty blood activates the OVLT, which signals the supraoptic nucleus. That leads the pituitary to release vasopressin (antidiuretic hormone), which tells the kidneys to hold water while you feel thirsty. In hypovolemic thirst, a drop in blood volume or pressure, such as from blood loss, is sensed by baroreceptors. The kidney then releases renin, generating angiotensin II, which also acts on the OVLT. Low blood volume drives a craving for both water and salt.

4. Vasopressin also affects behavior
Vasopressin, the same hormone that limits urination, appears in research on pair bonding and monogamy in prairie voles, and some people use it as an aphrodisiac. Huberman says he is not suggesting anyone do that. He warns against using vasopressin or oxytocin nasal sprays unless a doctor prescribes them.

5. The health-risk curve for sodium may be J-shaped
Huberman highlights a 2011 JAMA study on urinary sodium and potassium excretion. In it, the risk of cardiovascular death, stroke, heart attack and heart-failure hospitalization was low-ish at about 2 g of sodium excreted per day and kept falling until about 4.5–5 g. Above that, risk climbed steeply toward 7–12 g. He cautions that no single study is definitive. The 2.3 g guideline exists partly because hypertension is so common.

6. Know your blood pressure before changing salt intake
People with hypertension or prehypertension need to be careful and should work with a doctor. By contrast, some people with low blood pressure or orthostatic disorders benefit from more sodium. Huberman stresses that over time, storing excess sodium in tissues is bad for health.

7. Salt appetite is homeostatic, but it adapts
If your sodium is low, you will tend to crave salty foods, and on a mostly unprocessed diet it is usually reasonable to follow that craving. However, a controlled German study of people eating 6, 9 or 12 g of salt a day, published in the Journal of Clinical Investigation, found that the body adapts. Sodium was stored and released in regular weekly and monthly rhythms, regulated by aldosterone and glucocorticoids. That adaptation is why appetite alone isn't a perfect guide.

8. Low sodium can worsen stress and anxiety
The adrenal stress system (glucocorticoids such as aldosterone) is tightly linked to salt craving. Animal studies, and some human evidence, suggest low dietary sodium exacerbates anxiety and impairs the ability to meet stressors. Low blood pressure itself can feel like anxiety. Huberman says more studies are needed. He suggests that a slight sodium increase from sea salt in water or salting food, not processed foods, might help some people.

9. Neurons literally run on sodium
Action potentials depend on sodium rushing into neurons, followed by potassium changes and the sodium-potassium pump restoring the gradient. That is why sodium, potassium and magnesium all matter for mental and physical performance, and why dehydration and electrolyte loss cause brain fog.

10. The gut senses sugar below conscious awareness
The episode opens with Diego Bohórquez's Duke lab. Its 'neuropod' gut cells detect sugar and signal through the vagus nerve to drive dopamine release and sugar seeking. A February 2022 Nature Neuroscience paper, 'The Preference for Sugar over Sweetener Depends on a Gut Sensor Cell', showed that these cells can tell caloric sugar apart from non-caloric sweeteners. What that means for health is not yet clear.

EXAMPLES

1. Guidelines for orthostatic disorders
Citing a review titled 'Dietary Sodium and Health: How Much Is Too Much for Those with Orthostatic Disorders', Huberman notes that some recommendations for POTS and orthostatic hypotension are 6–10 g of salt per day, about 2,400–4,000 mg of sodium. The Canadian Cardiovascular Society suggests 10 g of salt, or about 4 g of sodium.

2. The sea-salt packet anecdote
Someone with low blood pressure who constantly craved sugar and felt lightheaded tried, with a doctor's permission, taking a pinch of sea salt in water, or a salt packet, instead of sugary food. They reported big relief from dizziness. Huberman labels this 'anec-data', not evidence, and specific to low blood pressure.

3. Salty-sweet foods bypass satiety
Salt and sweet each have their own 'enough' threshold, and combining them masks both, so you eat more. Hidden sugars

and sweeteners in processed foods work the same way. A sip of water with lemon or vinegar quickly cuts an overly sweet taste. Huberman notes that 'The Salt Fix' reviews data suggesting more salt on an unprocessed diet can reduce sugar cravings.

4. Adrenal removal shifts salt preference

In adrenalectomy studies, mostly done in animals, removing the adrenal glands and their hormones shifted the point at which a solution feels 'too salty'. Subjects then preferred and tolerated much saltier fluids. Huberman uses this extreme case to show how directly the stress-hormone system sets salt appetite. Normally, very salty water such as seawater is aversive, and drinking seawater can kill you.

OTHER RELEVANT

1. Hydrate with electrolytes for exercise and mental work

The Galpin equation: body weight in pounds ÷ 30 = ounces of fluid every 15 minutes, as an average rather than a timer. Start sessions already hydrated with sodium, potassium and magnesium, not just plain water. People lose roughly one to five pounds of water per hour of exercise. Hot conditions, and cold dry ones, increase fluid and salt losses.

2. Adjust for low-carb diets, fasting and caffeine

Low-carbohydrate diets make you shed water along with sodium and potassium, so many people need more of both. Caffeine is a diuretic. Huberman adds salt or an electrolyte drink, or sea salt in water, when he drinks caffeine during his fasting window or before fasted training.

3. Find your own salt needs on unprocessed foods

The more your diet is built from simple, unprocessed foods, the easier it is to read your own salt appetite. Factor in blood pressure, exercise, climate, diet and caffeine. For iodine and iodized versus non-iodized salt, see his metabolism episode.

4. Magnesium forms mentioned

Magnesium malate may reduce muscle soreness. Magnesium threonate, taken 30–60 minutes before bed, may help sleep and possibly cognition (mostly animal data). Bisglycinate seems on par with threonate for sleep. Citrate mainly works as a laxative. Check with your physician.

Using Hypnosis to Enhance Health & Performance | Dr. David Spiegel

Guest: Dr. David Spiegel
Date: 2022-02-21 · Duration: 1:52:41
URL: https://www.youtube.com/watch?v=PctD-ki8dCc

KEYPOINTS

1. Hypnosis is highly focused attention, not sleep or loss of control
Spiegel likens it to looking through a telephoto lens: rich detail with little surrounding context. Getting so absorbed in a film that you're part of the movie rather than evaluating it is a hypnotic-like state. Rather than giving up control, self-hypnosis is a way to gain more of it over your mind and body.

2. Three brain changes mark entry into hypnosis
In Spiegel's fMRI work comparing highly and non-hypnotizable people, activity drops in the dorsal anterior cingulate cortex (part of the salience network, a 'conflict detector'), so you're less easily pulled out. Connectivity rises between the left dorsolateral prefrontal cortex (executive control) and the insula, a mind-body control hub. And the DLPFC becomes inversely coupled with the posterior cingulate (default mode network), which underlies the dissociation of doing something without reflecting on what it means for you.

3. Hypnotizability is a stable trait you can measure
About a third of adults are not hypnotizable, about two-thirds are, and roughly 15% are highly hypnotizable. Spiegel scores it 0–10 with the Hypnotic Induction Profile. Practice may raise it slightly: in one training study, initial scores explained about three times as much of the final score as training did. Spiegel says it's better to use the capacity you have than to try to boost it.

4. The eye-roll sign roughly predicts hypnotizability
Developed by Spiegel's father, Herbert Spiegel: look up toward the ceiling, then slowly close your eyelids while keeping your eyes up. If mostly the white of the eye shows as the lids close, you're likely moderately to highly hypnotizable; if the iris drops into view, likely less so. Closing your eyes while staying alert is an unusual state that signals the brain to turn inward.

5. Hypnosis can separate the body's stress reaction from the stressor
Stress snowballs: you notice your heart racing or sweating, interpret it as bad, and feel worse. Spiegel teaches people to imagine their body floating somewhere safe (a bath, a lake, space) while picturing the problem on an imaginary screen. The rule is to keep the body comfortable whatever appears on the screen. You can't control the stressor yet, but controlling your physical reaction restores a sense of agency and room to plan one step.

6. Hypnosis is a problem-focused tool with specific best uses
Spiegel highlights stress, sleep, pain, phobias, smoking cessation and habits. For ADHD and OCD it depends on hypnotizability: very obsessional, over-controlling people tend to evaluate rather than experience, and often score low. Spiegel guesses that many people with ADHD would not be very hypnotizable, but says he hasn't studied it.

7. Repeated practice may strengthen these networks
Citing Carla Shatz's 'neurons that fire together wire together' (Huberman notes it is often misattributed to Donald Hebb), both suggest regular self-hypnosis trains the circuits. You can practice during the day for stress, then use the skill when a stressor or a middle-of-the-night waking comes up.

8. Stage hypnosis gives the practice a bad name and can cause harm
Stage performers pre-screen audiences for the most hypnotizable people. Spiegel's father treated a woman who wandered New York dissociated after a stage hypnotist had her play with an imaginary bird. The image had tapped her feeling of being 'a bird in a gilded cage'. The same suspension of critical judgment that makes hypnosis therapeutic can be misused.

9. Breathing and eye position are key ingredients
Spiegel now emphasizes a deep breath followed by a slow exhale during induction, informed by joint work with Huberman suggesting exhale-emphasized breathing such as cyclic sighing promotes parasympathetic calm. Hypnotic-like states also occur at peak performance: pianists who 'float above the piano' and athletes in flow aren't thinking step by step.

EXAMPLES

1. The asthmatic teenager at Children's Hospital
As a medical student, Spiegel met a 16-year-old in status asthmaticus whose two epinephrine injections had failed, and doctors were considering general anesthesia. He hypnotized her with the suggestion that each breath would be deeper and easier. Within five minutes she was lying back and no longer wheezing. A nurse filed a complaint, and the team ultimately asked the patient, who chose to continue. She had one later hospitalization and went on to become a respiratory therapist.

2. Imaginary meals changed stomach acid
Highly hypnotizable people taken on an imagined 'culinary tour' increased gastric acid secretion by about 87%. One woman asked to stop because she felt full. Relaxing and thinking of anything but food cut secretion about 40%, and even after an injection of pentagastrin, which triggers acid release, hypnosis produced a 19% reduction.

3. Lancet trial during awake vascular procedures
Patients undergoing roughly 2.5-hour procedures, such as tumor chemoembolization, got standard care (self-administered IV opioids), standard care plus a supportive nurse, or self-hypnosis. By 1.5 hours, the hypnosis group's pain was about 80% lower than standard care. They used half the opioids, had fewer complications and finished about 17 minutes sooner, with near-zero anxiety versus scores of 5 out of 10.

4. Metastatic breast cancer support groups

In a randomized trial, women with advancing disease met weekly and learned self-hypnosis for stress, anxiety and pain. After a year, the treatment group had half the pain of controls on very low medication. Women described doing the exercise, imagining a warm bath, when they felt chest pain and feared a metastasis.

5. Response prevention for a superstitious habit

Huberman described breaking an illogical ritual by forcing himself not to do it for about a week. Spiegel called this response prevention: you build a new context in which you get the outcome you want without the extra behavior.

OTHER RELEVANT

1. Night-waking tool

Don't check the clock, which Spiegel calls an arousal cue. Instead, put whatever you're worrying about on an imaginary screen while keeping your body floating and comfortable, then drift back to sleep. Huberman says self-hypnosis is his main tool for falling back asleep.

2. See a licensed clinician first for medical problems

Choose a professional trained in medicine, psychology or dentistry, not 'just a hypnotist'. An assessment can make sure, for example, that hypnosis isn't easing chest pain that is actually heart disease. The Society for Clinical and Experimental Hypnosis lists trained practitioners.

3. Short sessions can be enough

Spiegel typically sees patients once or twice, tests hypnotizability, then teaches self-hypnosis. His Reveri app, which Huberman says he is involved with, offers roughly 15-minute sessions and 1–2 minute refreshers. Spiegel reports about two-thirds of users feel better even after a one-minute refresher, so you learn quickly whether it's likely to help you.

4. Low scorers have other options

If you're not hypnotizable, Spiegel moves to medication, systematic desensitization or mindfulness rather than forcing it. Highly hypnotizable people do best with little explanation; moderate scorers prefer to understand what's happening, but still benefit.

Using Play to Rewire & Improve Your Brain

Date: 2022-02-07 · Duration: 1:46:35
URL: https://www.youtube.com/watch?v=BwyZIWeBpRw

KEYPOINTS

1. Play is regulated like hunger
Jaak Panksepp, known as the 'rat tickler', found that rats, puppies, kittens and other animals laugh at ultrasonic frequencies when tickled. He also showed that animals and children deprived of play play more once allowed, just as a hungry animal eats more. To Huberman, this places play deep in ancient brain circuitry rather than treating it as a recent, optional higher function.

2. Play runs on brainstem opioids that make the prefrontal cortex more flexible
The periaqueductal gray (PAG) releases small amounts of the body's own opioids, such as enkephalins, during play. Far from dulling the prefrontal cortex, Huberman says, this state lets it take on different roles and test more 'if I do this, then that happens' contingencies. These internally made opioids are distinct from the drugs behind the opioid crisis.

3. The key chemistry is high opioids plus low adrenaline, which requires low stakes
Play opens neuroplasticity only when the stakes are low enough that epinephrine stays down. Once you care too much about the outcome, stress chemistry takes over and the exploratory mode closes. Huberman calls play 'the portal to plasticity' at every age.

4. Our first rule is that relief comes from outside us
A baby in discomfort cries and someone outside resolves it with milk, water or being let out of the stroller. Huberman notes many adults never outgrow looking outside themselves to manage stress, sometimes reaching for alcohol. Through childhood play, we gradually test other contingencies and learn to regulate our own states.

5. Playful animals signal with 'partial postures'
Animals heading into rough-and-tumble play approach slowly with their fur down rather than raised. People about to play-fight similarly make themselves smaller, unless the context is truly competitive, like boxing or football. These signals tell the other side it's play, not a threat.

6. Role play trains prediction
Games that assign leader and follower, dominant and submissive, or solo and group roles force the prefrontal cortex to run more prediction algorithms from new standpoints. Huberman cites his sister's doll-house games and imaginary friend as ordinary examples.

7. Development is largely pruning, and play guides it
Roughly 40% of the connections present early in life are removed by age 25. Glial cells physically separate and even eat unused synapses (work from Beth Stevens' lab at Harvard). Play strengthens some connections and prunes others. Huberman notes 'fire together, wire together' is often credited to Donald Hebb but was coined by Carla Shatz.

8. Trauma suppresses play circuits, and play can help reopen them
Chronic stress means chronic epinephrine, which shuts down play circuitry. Huberman says this is why children with heavy trauma show limited plasticity later. Some prominent treatments for severe, long-lasting trauma now use dance and unfamiliar body movement, and he doubts any pill will simply erase trauma.

9. Novelty matters more than mastery
An expert chess player gains less play-related plasticity from chess than from something new, such as soccer. Getting better at what you already know improves only that skill. Novel activities expand how adaptable you are in relationships, finances and life generally.

EXAMPLES

1. Smartphone reading suppresses sighing (Honma et al.)
In 34 healthy people, reading on a smartphone produced worse comprehension than reading on paper. Overall breathing patterns were the same, but physiological sighs (a double inhale and long exhale, normally about every 5 minutes) were suppressed, and the prefrontal cortex became overactive. Huberman distinguishes this from 'email apnea' and suggests deliberate sighs or printed material for important reading.

2. Feynman's playful spirit
Richard Feynman learned to paint and draw well into his 60s and was infamous for bongo drumming on the Caltech roof, sometimes naked. He wrote about working to keep his playfulness because it helped him see the world differently and make discoveries.

3. Tinkerers at NASA
Huberman notes that NASA, and later competitive companies, became known for favoring applicants who were tinkerers as children. Low-stakes exploration, such as hitting balls without caring whether they land in, expands the range of moves that drilling alone can't.

4. Competitive but joyful horseshoes
A friend of Huberman's plays horseshoes to crush him every time and clearly loves it. You can compete and still play, Huberman says, as long as you're enjoying yourself.

5. Personal play identity (Güne òÂ # # •
A review in Current Psychology by Gökhan Güne ò FW67 ibes four dimensions of how we play: play style and personality, socio-

cultural setting and environment, economics, and technology. Patterns set in childhood carry into how adults approach play.

OTHER RELEVANT

1. Schedule at least an hour of pure play a week

Choose something novel and low-stakes, ideally with several possible roles and no rigid linear structure, and don't worry about getting good at it. Huberman sees this as going beyond 'beginner's mind', which still assumes you're working toward proficiency.

2. Add novel movement and speeds

Huberman, who runs about three times a week, has added backward walking and backward sled pulls after following Ben Patrick (the 'knees over toes guy') and finds them good for his back. Dynamic, unfamiliar movement is one of the two forms of play he says has good peer-reviewed support for plasticity.

3. Don't assume exercise alone covers it

Regular exercise sharpens thinking for many people, though very intense sessions temporarily blunt it. Repetitive, linear exercise doesn't offer the role and contingency exploration that play does. For more guidance, Huberman recommends Charlie Hoehn's 'Play It Away: A Workaholic's Cure for Anxiety'.

Breathing for Mental & Physical Health & Performance | Dr. Jack Feldman

Guest: Dr. Jack Feldman
Date: 2022-01-10 · Duration: 2:23:37
URL: https://www.youtube.com/watch?v=GLgKkG44MGo

KEYPOINTS

1. We breathe to get oxygen in and, just as importantly, to get CO2 out to control blood pH
Aerobic metabolism produces carbon dioxide, which shifts the blood's acid-base balance, and every cell is sensitive to pH. Inhaling works like pulling a balloon apart: the diaphragm contracts downward and external intercostals lift the ribs, lowering pressure in the alveoli so air flows in.

2. Each breath starts in the pre-Bötzinger complex, a few thousand neurons in the brainstem
Feldman's lab discovered this bilateral region, which initiates every inspiration and drives the motor neurons of the diaphragm and intercostals. Breathing muscles are skeletal and need neural input, unlike the heart. Airway smooth muscle is separate, and asthma is inappropriate constriction of it. Feldman says the evidence so far does not implicate the pre-Bötzinger complex in asthma.

3. Active exhalation has its own oscillator, the parafacial nucleus
Feldman admits they initially assumed one source for both inhale and exhale. That missed the fact that at rest exhalation is passive. Experiments in the early 2000s identified a second region that drives active expiration, as during exercise.

4. Nose vs mouth and belly vs chest are largely beside the point for the core muscles
At rest we default to nasal breathing; during exercise the mouth's larger airway moves more air. Diaphragm and intercostal contraction are almost 'agnostic' to whether the nose or mouth is open. We are obligate diaphragm breathers, and Feldman is agnostic about whether belly-out breathing matters for breathwork's effects on emotion and cognition.

5. You sigh roughly every five minutes to reinflate collapsing alveoli
People guess they sigh about once an hour, two orders of magnitude too low. The lungs hold about 500 million alveoli, each about 200 microns across and lined with fluid (surfactant), and surface tension makes them slowly collapse. A normal breath can't pop them open; a deep sigh, through nose or mouth, can. Lie quietly and you'll notice the automatic deep breath every few minutes.

6. Sighs are triggered by bombesin-related peptides acting in the pre-Bötzinger complex
Stress releases bombesin-related peptides from the hypothalamus, and stressed people sigh more. Injecting about $50 worth of bombesin directly into the pre-Bötzinger complex of rats took their sigh rate from 20–30 per hour to about 500 per hour. Ablating the receptor-bearing cells with a saporin conjugate stopped sighing. Lung function and overall health then deteriorated so badly the rats were euthanized, though secondary cell damage couldn't be ruled out.

7. Breathing and emotion influence each other in both directions
Kevin Yackle, with Lindsey Schwarz in Liqun Luo's lab, found pre-Bötzinger neurons that project to the locus coeruleus, the brain's arousal 'sprinkler system'. Ablating them made mice calmer, with EEG changes consistent with calm. Fear responses to faces, reaction time and pupil size all vary between inhale and exhale.

8. Slow breathing practice dramatically reduced fear in mice
With a startup grant from the NIH's complementary medicine institute (NCCIH), and after about three years of failed attempts, Feldman's lab slowed awake mice's breathing tenfold for 30 minutes a day over four weeks. In fear conditioning run with Michael Fanselow, these mice froze far less than controls, an effect Fanselow likened to a major amygdala manipulation. The work stalled when the grant and postdoc left.

9. Breathwork may work by disrupting entrenched circuits
Feldman's hypothesis is that brain oscillations tied to breathing help process signals, and that 30 minutes of altered breathing perturbs a stuck network, much as electroconvulsive therapy or brain stimulation do more bluntly. Repeated sessions could gradually 'fill in the rut' before the circuit rebuilds. He stresses this is still a hypothesis.

10. Episodic hypoxia shows lasting benefits in research settings
Work since the 1980s (David Millhorn) and now Gordon Mitchell at the University of Florida alternates about three minutes of low oxygen (typically 8%) with about five minutes of normal air. Ventilation then stays elevated for hours, with apparent benefits to motor and cognitive function. Feldman warns listeners not to try 8% oxygen, and notes breath holds differ because CO2 rises too.

EXAMPLES

1. Iron lungs and polio
Early negative-pressure ventilators had high mortality until bigger breaths were given. In the 1950s clinicians realized one big 'sigh' breath every few minutes was enough, and mortality dropped. Modern ventilators still deliver a periodic super-breath.

2. The Krasnow–Yackle bombesin moment
Visiting Mark Krasnow's Stanford lab, Feldman was told they'd found a molecule concentrated in a breathing region but couldn't reveal it. Rushing to a flight, he asked whether it was related to bombesin. It was, which led to the collaboration on sigh circuitry.

3. A stroke patient's ankle
In Mitchell's work, a stroke patient with ankle weakness showed much stronger ankle extension after episodic hypoxia; the approach is being studied for spinal cord rehab and athletic performance. Feldman would like to run a placebo-controlled study on golfers' drive length and dispersion.

4. Magnesium threonate trial

Feldman's former student Guosong Liu found that raising magnesium within the physiological range (0.8–1.2 mM) lowered neural noise and strengthened LTP, and magnesium-enriched rats showed better cognition and longevity. Ordinary magnesium salts absorb poorly and cause diarrhea, so chemist Fei Mao developed magnesium threonate. In a placebo-controlled trial in people with mild cognitive decline (age about 51, cognitive age about 61), placebo improved two years and the compound eight. Feldman discloses that he advises Neurocentria, the company Liu runs as CEO.

5. Breathing timing in combat

Reaction time and punch speed differ between inhale and exhale. Feldman wonders whether martial artists exploit an opponent's breathing cycle, while noting strikes also involve bracing (Valsalva).

OTHER RELEVANT

1. Feldman's own practice: simple box breathing

A self-described beginner, he does 5–20 minutes of box breathing (5 s inhale, 5 s hold, 5 s exhale, 5 s hold, sometimes 10 s), often after lunch, when performance tends to dip. He suggests friends try 5–10 minutes for a few days and stop if it doesn't help, starting simple like a couch potato beginning with walks.

2. Try varying the pattern (the 'Feldman protocol')

Huberman proposes deliberately randomizing breath durations and styles to learn how state transitions feel, like learning to shift gears. Feldman likes the idea of disruption but says no controlled data yet compare patterns.

3. Nasal breathing while learning

Huberman cites Journal of Neuroscience papers linking nasal breathing during learning to better memory. Feldman finds it plausible because the olfactory pathway adds breathing-locked rhythms to the forebrain, but says experiments still need to separate nasal from central effects.

4. Be conservative with magnesium threonate

Feldman takes half the commercial dose because his blood magnesium went from low-normal to high-normal on it. Friends rarely notice big cognitive changes, though some report feeling more alert or sleeping better. Discuss with a physician.

The Science of Making & Breaking Habits

Date: 2022-01-03 · Duration: 1:50:38
URL: https://www.youtube.com/watch?v=Wcs2PFz5q6g

KEYPOINTS

1. There is no fixed number of days to form a habit
Huberman cites a 2010 study (first author Lally) on the habit of walking after dinner. People took anywhere from 18 to 254 days to form it, judged by doing it about 85% of the time with little mental effort. Being slow to form one habit does not mean you will be slow with others.

2. 'Limbic friction' is the activation energy a habit requires
Huberman coined the term for the conscious, top-down effort needed to override an autonomic state that blocks a behavior. That state can be too tired or unmotivated for an energetic habit like cardio, or too anxious and wired for a calming one like meditation. It is more concrete than 'motivation' because it points to specific circuits and a state you can assess.

3. Habit strength depends on context-independence and low limbic friction
Drawing on Wendy Wood and Dennis Rünger's review 'Psychology of Habit' (Annual Review of Psychology), a strong habit happens the same way whether you are at home or traveling, and takes little activation energy. The goal is automaticity. Brushing your teeth is the model: most people do it even after a terrible night.

4. Linchpin habits are enjoyable ones that make other habits easier
For Huberman, cardio and resistance training three to four times a week each, typically early in the day, make sleep, alertness, hydration and better food choices easier. Linchpin habits are always ones you enjoy.

5. Walking through a habit's steps once makes it markedly more likely
Procedural memory holds the sequence of steps needed for an outcome, like a recipe. Mentally rehearsing every step of a new habit (walk into the kitchen, turn on the espresso machine, pull the shot) even once shifts the likelihood of doing it from unlikely to very likely over time, according to the psychology literature. Mechanistically this is Hebbian learning: NMDA receptors respond to strong input by recruiting more receptors, lowering the firing threshold of the neurons the habit will use.

6. Task bracketing in the dorsolateral striatum anchors habits
The basal ganglia contain go and no-go circuits for doing and not doing things. Recordings in animals and humans show that the dorsolateral striatum is active at the start and end of a habitual behavior rather than during it, bracketing the task. Strong bracketing is what makes a habit happen even when you are tired, distracted or overwhelmed.

7. Anchor habits to brain-body states, not clock times
Huberman says a fixed time helps in the short term, but over the long term the nervous system generates behavior based on state: activation, focus and fatigue. So he divides the day into phases tied to their neurochemistry, rather than rigid times.

8. Reward prediction error can be extended around a habit
Dopamine rises in anticipation, rises most for unexpected rewards, and falls below baseline when an expected reward is withdrawn, for example checking your phone at minute 50 of a 60-minute writing block. Huberman's 'dopamine spotlighting' means honestly anticipating the hard start and the good feeling afterward, so the whole time window, including the brackets, gets associated with reward. He stresses that you cannot lie to yourself about enjoying the hard parts.

9. Breaking a habit requires weakening its circuits (long-term depression)
Huberman says reminders and sticky notes work only in the short term. Shocks and monetary penalties work when people are monitored but fail when people police themselves. Because the neurons for a bad habit fire together reflexively, the practical lever is the moment right after you catch yourself doing it.

EXAMPLES

1. Phase 1 (0–8 hours after waking): high-friction habits
Norepinephrine, epinephrine, dopamine, cortisol and body temperature are naturally elevated. Morning sunlight within 30 minutes, exercise, cold exposure, caffeine, fasting and tyrosine-rich foods (or, for some, supplements like alpha-GPC or L-tyrosine; consult a doctor) push the state further. Place the habits that take the most activation energy here.

2. Phase 2 (about 9–14/15 hours after waking): low-friction habits
Dopamine, norepinephrine and cortisol taper while serotonin rises. Dim and lower your lights, get some low-angle sunlight, use NSDR, heat or sauna. Use this phase for mellower habits you already partly do, like journaling, practicing a hard piece of music or language study. Huberman mentions ashwagandha for lowering cortisol but cautions against using it for more than about two weeks without a break.

3. Phase 3 (16–24 hours after waking): consolidation
The rewiring triggered during the day happens in deep rest and sleep. Keep the room dark and cool (core temperature drops by about 1–3 degrees), go to bed fed enough not to wake hungry, and avoid caffeine late in the day.

4. The 21-day habit installation and testing system
List six new daily habits but expect to complete only four or five, with no punishment and no compensating the next day for a 'habit slip'. Think in two-day chunks, then reset. After 21 days, add nothing new; spend the next 21 days checking which habits have become automatic, and add more only once all six are reflexive.

5. Bob Knight's graduate school rule
Huberman recalls UC Berkeley neurologist Bob Knight telling him not to adopt any routine you cannot keep up at least five, ideally six, days a week. Knight added that the routine may need updating every four or five years.

OTHER RELEVANT

1. Follow a slip with 'positive cargo'

When you catch yourself in a bad habit, such as reflexively picking up your phone, immediately do a short, easy positive behavior: drink water, do some breathwork, or spend five minutes on language practice. This turns a closed loop into an open one that is easier to interrupt. Huberman compares it to adding new notes after a piano chord you keep playing by reflex.

2. Map your own habits first

Note which habits are easy, which are hard and which you want to break, how context-dependent each is, and how much limbic friction each takes. Then assign them to phases of the day.

3. Know the limits

Huberman acknowledges that breaking bad habits is genuinely hard. He treats true addictions as a separate, more serious problem and points to his episode with Dr. Anna Lembke.

Science of Social Bonding in Family, Friendship & Romantic Love

Date: 2021-12-20 · Duration: 1:33:22
URL: https://www.youtube.com/watch?v=RgAcOqVRfYA

KEYPOINTS

1. Social bonds run on a homeostatic circuit, like hunger and thirst
Building on Kay Tye's work, Huberman describes a 'social homeostasis' system with a detector, a control center and an effector. It compares the social contact you have with what you expect and drives you to correct the gap. The detector is mainly the anterior cingulate cortex and basolateral amygdala. Hypothalamic and dopamine circuits act as control and effector, and the prefrontal cortex adjusts for shifting social hierarchies, such as who takes the lead in different settings.

2. Loneliness is a mismatch, not just isolation
Psychologist John Cacioppo defined loneliness as the distress that results from discrepancies between ideal and perceived social relationships. What people expect from friendship varies hugely, but the underlying bonding circuit is the same.

3. Dorsal raphe dopamine neurons encode 'social hunger'
In a paper from Kay Tye's lab (first author Gillian Matthews), activating dopamine neurons in the dorsal raphe nucleus induced a loneliness-like state that drove animals to seek social contact; inhibiting them suppressed it. Counterintuitively, loneliness corresponds to more dopamine release from this small cluster, which motivates seeking. Once enough contact occurs, output drops. Where an animal sees itself in the social rank changed whether this drove approach or withdrawal.

4. Short-term isolation makes us social; chronic isolation makes us withdraw
Missing an expected interaction triggers a dopamine-driven push toward people. With prolonged isolation, animals and humans become more antisocial, much as someone used to multi-day fasting doesn't scramble for a missed meal. Chronic isolation raises cortisol, harms immunity and increases the peptide tachykinin (found in flies, mice and humans), which makes the isolated individual irritable and even aggressive once contact returns.

5. Introverts may get more dopamine per interaction, not less desire
In this model, introverts aren't people who dislike socializing. They feel satisfied by less social contact because each interaction releases more dopamine. Extroverts get less dopamine from the same interaction and need more frequent or longer contact to reach their threshold.

6. Social and food cravings share circuitry
People who are socially isolated often eat more or switch to comfort foods. Huberman frames this as the brain seeking dopamine elsewhere when social sources are unavailable, rather than simply as a pathology.

7. Bonds form through synchronized physiology
Heart rate, breathing, pupil size, skin conductance and even shifts in body temperature can synchronize between people. Felt closeness correlates strongly with that synchrony, in both directions. Huberman calls it the concert phenomenon: shared external experiences align internal states.

8. Strong bonds need both emotional and cognitive empathy
Emotional empathy is feeling what someone feels at an autonomic, visceral level. Cognitive empathy is understanding how they think, which doesn't require agreeing. Parent-child bonds, romance and deep friendships involve both. Huberman notes Karl Deisseroth's point that we never truly know another person's feelings; we infer them.

9. Early attachment patterns replay in adulthood
Huberman highlights psychoanalyst Allan Schore's work on right-hemisphere-biased, largely autonomic attachment between infant and caregiver, which he says is re-expressed in adult bonds. Huberman stresses that popular 'emotional right brain, rational left brain' ideas are mostly wrong. Schore's claim concerns specific lateralized attachment circuits.

10. Oxytocin is the long-acting hormonal 'glue'
Oxytocin is involved in milk let-down, uterine contraction and cervical dilation, social recognition, pair bonding, and even honesty in some inhaled-oxytocin experiments. It also has links to autism. Huberman describes a debated sex difference: in females, sexual activity and orgasm release oxytocin, while in males, arousal triggers vasopressin and orgasm releases oxytocin about 30 minutes later.

EXAMPLES

1. Ten hours of isolation in humans
In a Nature Neuroscience study, socially connected adults spent about 10 hours isolated with no social media, email or even fiction. When they viewed images of people interacting, dopamine-related areas responded more, and they also responded more to food. In the reverse experiment, 10 hours of fasting in non-fasters increased craving for social interaction.

2. Same story, synchronized hearts
People who listened to the same story at different times and places developed closely matching heart rate patterns, with the intervals between heartbeats almost mapping onto one another. Huberman takes this as evidence that a shared narrative can align physiology even without being together.

3. Oxytocin genes and Instagram
A Heliyon study (first author Carollo) linked variants in the oxytocin and oxytocin receptor genes to an Instagram sociability index based on follower-to-following ratios. Carriers of certain variants sought more online social interaction. Huberman calls it an exploratory but notable first in merging social media data with genetics.

4. Raising a puppy as a model of autonomic bonding

Huberman describes his bond with his late bulldog, Costello, as deeply emotional and autonomic rather than cognitive, built on touch, walks and fun. While house-training him as a puppy, Huberman lost his appetite and much of his capacity for cognitive work. He was sleep-deprived but almost entirely focused on forming that caretaking bond, the way parents describe early infancy.

OTHER RELEVANT

1. Bond through shared external experiences

To deepen a connection, share a story, music, a sports event or a novel experience that drives physiological synchrony. Huberman tells of his sister, whose dates who took her dancing tended to turn into longer relationships than dates at jazz clubs, where you just sit. Creating a common physiological response through a shared experience is a good entry point. Physical contact helps only where it suits the relationship.

2. Practice cognitive empathy deliberately

In conflict, focus on actually understanding how the other person thinks about the issue, then notice how you think and feel about it. Agreement isn't the goal; understanding is.

3. Watch for comfort eating as a sign of social hunger

If isolation pushes you toward food, recognize it as dopamine-seeking and look for social contact instead. After long isolation, expect re-entry to feel harder and more irritable than you'd predict, and ease back in.

4. Expect breakups to hurt like withdrawal

Losing a bond removes a major source of dopamine and oxytocin and breaks both emotional and cognitive empathy, a form of social isolation even when you're surrounded by people. Huberman quotes Lisa Feldman Barrett: we are nervous systems influencing other nervous systems.

Erasing Fears & Traumas Based on the Modern Neuroscience of Fear

Date: 2021-12-06 · Duration: 2:13:50
URL: https://www.youtube.com/watch?v=31wjVhCcI5Y

KEYPOINTS

1. Huberman calls fear a generic 'threat reflex'
Like the spinal reflex that lifts one foot off a tack while bracing the other leg, the threat reflex speeds the heart, sharpens vigilance and mobilizes energy. At the same time it shuts down circuits for calm, sleep and wide-field perception. It isn't built for any particular danger, so almost anything can become frightening if it's paired with activation of this system.

2. The amygdala is a final common pathway, not a 'fear center'
The almond-shaped amygdaloid complex, with about 12 subregions, combines memories from the hippocampus with input from the senses to trigger the reflex. Its outputs go to areas for freezing, pain control and alertness, and also to the dopamine reward system. That second link turns out to be key for rewiring fear.

3. The stress hormone axis gives fear a long tail
The hypothalamic-pituitary-adrenal (HPA) axis has a fast phase and a slow one. The slower hormonal phase can change gene expression over days and build circuits that embed a fear. Huberman notes that this same slow machinery is what lets fears be undone.

4. Fear is learned by strengthening synapses
An intense event activates NMDA receptors, setting off long-term potentiation, which turns a weak connection into a 'high-speed' one, so that even a thought can trigger the reflex. Extinction runs this in reverse through long-term depression, a weakening of those connections. He says common drugs such as SSRIs, benzodiazepines and beta blockers ease symptoms only indirectly and don't target this circuitry.

5. Removing a fear takes three steps, in order
First, retell the trauma in detail again and again until 'a terrible, upsetting story becomes a terrible, boring story'. This is extinction, used in prolonged exposure, cognitive processing therapy and CBT. Then build a new narrative with genuine reward, and tie it explicitly back to the original event. This works because the prefrontal cortex's input to the threat circuit is inhibitory, acting as a brake.

6. EMDR's side-to-side eye movements suppress the threat circuit
Huberman, a vision scientist, was skeptical of claims that EMDR mimics REM sleep (false) or links the two brain hemispheres. Then five papers he reviewed showed that lateral eye movements suppress the amygdala, possibly because they're the eye movements of moving forward, which is incompatible with freezing. Colleagues told him it works best for single-event traumas, not a whole bad childhood, and that it mainly handles extinction, not building a new narrative.

7. Social isolation chemically amplifies fear
Work from David Anderson's lab at Caltech and Kerry Ressler's at Harvard shows that tachykinin rises in the central amygdala after trauma, drives anxiety and irritability, and climbs further with isolation. Trusted social contact lowers it, which is why Huberman stresses social connection alongside trauma work.

8. A predisposition to trauma can be inherited
Ressler's work on FKBP5 gene variants (and Brian Dias's studies of inherited smell-linked fear) suggests that abuse, especially in fathers, can pass down a more sensitive cortisol stress system. What's inherited is a lower threshold, not the specific trauma, and treatment is the same either way.

9. Ketamine and MDMA appear to compress the same process
A study from Karl Deisseroth, Robert Malenka and Liqun Luo at Stanford linked ketamine's dissociation to a 1–3 Hz rhythm in layer-5 neurons of the retrosplenial cortex. Ketamine-assisted therapy is legal with a physician's prescription. MDMA, which was then still illegal outside clinical trials, raised plasma oxytocin to about 84 pg/mL versus about 19 at baseline, alongside dopamine and serotonin. Huberman says both seem to make extinction and new learning happen faster, rather than working as magic potions.

10. Brief, self-chosen stress may reverse chronic stress
A study in mice found that five minutes a day of intense stress for two weeks reversed depression-like effects of chronic stress, while 15 minutes a day made them worse. A Science paper showed that the insular cortex matches how strong your bodily reaction is to how serious the threat really is. Psychiatrist David Spiegel adds that what matters is how you got into a stress state and whether you chose it.

EXAMPLES

1. One break-in, a whole city ruined
After a friend's car was broken into, they swore never to return to San Francisco. Huberman uses this to show how a single event can generalize into a broad fear.

2. The child who stopped biking
After a crash on the way to soccer, a child avoids biking, sports and friends. Extinction alone isn't enough: the child needs new, enjoyable rides linked back to the accident ('I'm enjoying this despite the crash').

3. Jumpy versus calm
Some people leap out of their seat at a quiet 'hello', while Huberman's bulldog Costello barely moved his eyes. The insula sets that threshold, and it can be recalibrated.

4. Normal fear versus trauma

A racing heart and a poor night's sleep after nearly being hit by a car show a healthy fear system. Symptoms persisting weeks, months or years later have moved into trauma and PTSD.

OTHER RELEVANT

1. Huberman's five-minute breathing protocols

For calm: cyclic sighing (a double inhale through the nose, a long exhale through the mouth) repeated for five minutes. For deliberate stress: about 25–30 deep breaths, then exhale fully and hold for 25–60 seconds, repeating for five minutes. His lab's data with Spiegel's were then unpublished. Avoid the stress version if you're prone to panic attacks, and ideally have a clinician involved.

2. Supplements with evidence for anxiety, timed carefully

Huberman cites saffron at 30 mg (about 12 studies using the Hamilton Anxiety Rating Scale), inositol at 12–18 g a day for about a month (effects he says rival antidepressants), and kava (eight double-blind studies, often about 100 mg extract or 50–300 mg kavalactones, with no liver-toxicity signal reported). Check with a doctor, and don't take them around exposure sessions, since dampening the response undercuts extinction.

3. Self-medicating can drive trauma deeper

Alcohol and other ways of numbing the response stop extinction and relearning from happening. Sleep, nutrition and social connection are the foundation.

How Humans Select & Keep Romantic Partners in Short & Long Term | Dr. David Buss

Guest: Dr. David Buss
Date: 2021-11-29 · Duration: 2:13:02
URL: https://www.youtube.com/watch?v=HXzTbCEqCJc

KEYPOINTS

1. Long-term and short-term mating follow different rules
Buss's starting point is that what people seek in a marriage or committed partner differs from what they seek in a hookup or brief affair. He grounds this in Darwin's sexual selection: one sex's preferences set the terms of competition in the other. For example, if women prefer men able and willing to invest resources, men compete to acquire and display them. Long-term pair bonding is rare, found in only about 3–5% of mammals and absent in chimpanzees.

2. The 37-culture study found universal desires
Buss's large cross-cultural study found qualities both sexes want everywhere: intelligence, kindness, mutual attraction and love, good health, dependability and emotional stability (women prioritize stability slightly more). 'No one wants a stupid, mean, ugly, disease-ridden mate,' he says, but this wasn't established before the study. He notes that love isn't a Western invention. The !Kung San of Botswana describe the same infatuation phase, which lasts weeks to perhaps six months before shifting into attachment.

3. Reliable sex differences in long-term preferences
Women more than men prioritize earning capacity, status, ambition and a strong 'long-term resource trajectory,' along with a slightly older age. Men more than women prioritize physical attractiveness and relative youth. Women aren't indifferent to looks, and Buss notes men overestimate how muscular women want them to be. These differences have held in roughly two dozen replications and in follow-ups in China, Brazil and India, even as traits like valuing virginity shifted over time.

4. Age gaps widen as men age
In Buss's data, men preferred women about 3–4 years younger, and women preferred men about 3.5–4.5 years older. US marriage statistics converge with this: the average gap is about three years at first marriage, five at second and eight at third. Buss notes that very large gaps create practical problems because partners grew up in 'different cultures.'

5. Deception is built into courtship
Both sexes deceive. Men commonly exaggerate the depth of their feelings and how similar their values are in order to signal long-term interest, because open bids for casual sex are ineffective. Buss cites unconfirmed reports, denied by Tinder, that about 30% of men on the app are married or partnered. He encourages people to skip endless texting and meet in person. Women have the more acute sense of smell, and a man who 'doesn't smell right' can be a deal breaker regardless of his other qualities.

6. Short-term preferences shift toward looks and risk
In short-term contexts, women weight physical appearance more heavily and favor 'bad boy' traits such as confidence, a little arrogance, risk-taking and defying conventions. In long-term contexts they look for 'good dad' traits. Men are willing to lower their standards for low-commitment sex. Women also use mate copying, finding a man more attractive when many other women want him (the rock-star groupie effect). Buss argues that women's attraction is more context-dependent than men's.

7. Women's affairs look more like 'mate switching' than seeking good genes
Kinsey estimated that about 26% of married women and 50% of men commit infidelity, and other studies report lower figures. Buss once backed the dual-mating hypothesis (resources from one man, genes from another) but now favors mate switching: leaving a relationship, trading up, testing one's desirability, or keeping 'mate insurance.' Key evidence is that about 70% of women who have affairs fall in love with the affair partner. Early findings that ovulation shifts women toward masculine, symmetrical men proved much weaker, and some large studies failed to replicate them.

8. Infidelity has sexual, emotional and financial forms
Women tend to define infidelity more broadly, while men focus on sex. Women are more upset by emotional infidelity (a cue that the partner's investment may leave), and men by sexual infidelity. Financial infidelity, meaning secret spending or hidden pooled resources, is less studied, but 30–60% of people keep some financial information from their spouse.

9. Mate-value gaps trigger jealousy, ranging from vigilance to violence
People tend to pair with partners of similar mate value, within about a point. If one partner's value rises, for example through a career taking off, jealousy can activate even without any rival, because the higher-value partner is statistically more likely to stray or trade up. A half-point gap rarely ends relationships, but larger ones do. Buss catalogs 19 tactics, from monitoring phones and partners' eye contact to intimate partner violence. He describes the violence as sometimes functioning to reduce a perceived gap, while stressing he doesn't endorse it.

EXAMPLES

1. The Cheaters show analysis
An analysis of the TV show Cheaters, in which betrayed partners confronted cheaters caught on camera, found a stark contrast. Men's first question was typically whether she had sex with him, and women's was 'Do you love her?' Buss links this to paternity certainty versus loss of commitment.

2. 'Men are like soup'
Illustrating mate insurance, Buss quotes a woman who said men are 'like soup, you always want to have one on the back burner.'

3. The conference organizer

A female colleague of Buss's found a conference organizer very attractive, then six months later wondered what she'd been thinking. As organizer he had been at the center of the room's attention structure. As an ordinary presenter he wasn't.

4. Attachment and infidelity

Offering what he calls informed speculation outside his main expertise, Buss says two securely attached partners favor a lasting bond. Avoidant people struggle more with intimacy and have a higher probability of infidelity, and anxious attachment can create a heavy 'relationship load.' Huberman wonders whether insecurity predicts distress over slow text replies.

OTHER RELEVANT

1. Meet in person early

Online profiles and long message threads leave room for deception and miss cues like smell and how someone handles themselves socially. Coffee gives a more accurate read.

2. Watch for over-fast declarations of depth and similarity

Exaggerated feelings and claims of perfectly aligned values are classic tactics for someone seeking short-term sex while signaling long-term interest.

3. Talk explicitly about what counts as infidelity

Partners often define it differently. Naming emotional and financial boundaries alongside sexual ones prevents mismatched assumptions.

4. Take jealous vigilance seriously

Phone hacking, following and stalking sit on a continuum that can end in violence. Buss's book When Men Behave Badly covers intimate partner violence and stalking in depth.

The Science of Gratitude & How to Build a Gratitude Practice

Date: 2021-11-22 · Duration: 1:25:57
URL: https://www.youtube.com/watch?v=KVjfFN89qvQ

KEYPOINTS

1. A good gratitude practice has outsized, long-lasting effects
Huberman cites studies in which doing a practice once to three times a week produced lasting gains in subjective well-being, meaning and awe, resilience against both past and future trauma, and better relationships across work, family, romance and one's relationship with oneself. He argues the anti-inflammatory and neural-circuit effects are on par with interventions people consider more potent, but only if the practice is the right kind.

2. Gratitude is a prosocial state that competes with defensive circuitry
Prosocial circuits draw us toward people, foods and experiences; defensive circuits drive backing away, guarding vital organs and a quaking voice. The two antagonize each other. Defensive circuits are probably more robust by default, much as the retina has more and stronger neurons for detecting darkening than brightening, which is why most people need deliberate practice to tilt the seesaw toward the prosocial side.

3. Serotonin and two cortical areas carry the gratitude signal
Serotonin, released mainly from the raphe nucleus in the brainstem, biases the brain toward approach and staying with an experience. Antonio Damasio's imaging work found gratitude activates the anterior cingulate cortex and medial prefrontal cortex, with activation scaling with how intensely gratitude was felt.

4. The medial prefrontal cortex sets context and meaning
The same discomfort produces different chemistry depending on framing. Entering an ice bath by choice, knowing its benefits, yields better dopamine and anti-inflammatory effects than being pushed in, even though the adrenaline and the cold are the same. Context-setting has limits, however: you cannot convince your brain that cutting your hand is good, and you cannot fake gratitude for something you actually hate.

5. Listing things you are grateful for is mostly ineffective
Writing or reciting three, five or 20 things you are thankful for, the most common approach online, does little to shift prosocial circuitry in most studies, which surprised Huberman because it was his own practice. Raising autonomic arousal first, for example with about 25 to 30 deep cyclic hyperventilation breaths, cold or chanting, can make such lists slightly more effective by intensifying the emotions involved.

6. Receiving thanks beats giving it
The most potent form is perceiving gratitude directed at you. Because you cannot wait around for others to thank you, the practical substitute is to recall a time you were genuinely thanked, or to absorb someone else's story of receiving help. The story need not resemble your own life; it only has to move you.

7. Story and theory of mind are the active ingredients
The brain organizes information as narrative. Theory of mind, the ability to model another person's experience, a concept developed by Simon Baron-Cohen, lets you experience gratitude second-hand. Gratitude circuits light up when an observer feels affiliation with the person receiving help.

8. Gratitude must be genuine on both sides
A Scientific Reports fMRI study had people receive varying sums of money from benefactors who gave wholeheartedly or reluctantly. Amount mattered, but the benefactor's wholehearted intention had the larger effect on felt gratitude. Huberman's takeaway: genuine thanks are what count, whether you give or receive.

9. Repeated practice rewires fear and motivation circuits
A study titled Effects of Gratitude Meditation on Neural Network Functional Connectivity and Brain-Heart Coupling, which used a resentment intervention as a control, found that regular gratitude practice changed resting-state connectivity so anxiety and fear circuits were less active while well-being and motivation circuits were more active. The interventions lasted only 5 minutes. Other work tracking practice for up to 6 weeks shows the circuits grow familiar with a narrative and activate more readily.

10. Serotonin-raising supplements are an optional, cautious add-on
Serotonin tilts the brain toward contentment with what is here, while dopamine and epinephrine pull attention outward toward pursuit. Huberman notes some people use 5-HTP or tryptophan, though for him they disrupt sleep architecture, with deep sleep followed by waking three hours later. Kanna (Sceletium tortuosum, sold as Zembrin), typically 25 to 50 mg, likely raises serotonin. He is not recommending either; check with your doctor and local law.

EXAMPLES

1. Stories synchronize heart rates across strangers
In a Cell Reports study by Perez and colleagues, people heard the same story in separate places or on different days, yet their electrocardiogram heartbeat intervals came to match almost identically. Since inhaling speeds the heart and exhaling slows it, the story's effects on breathing and heart rate are linked. Huberman uses this to argue that returning to one story reliably shifts body state.

2. Gratitude letter read aloud by a coworker
Researchers had coworkers secretly write a thank-you letter, then read it face to face while wearing a near-infrared spectroscopy cap. The recipient showed robust prefrontal activation, stronger than in the giver.

3. Damasio's genocide-survivor narratives

Subjects in an fMRI scanner watched survivors describe their ordeals and small acts of help, such as a fellow prisoner who was a doctor finding medicine for a woman who had been sick for weeks, or an ally giving someone glasses as their eyesight failed. Feeling affiliation with the storyteller activated gratitude circuitry, effectively receiving gratitude through another's narrative.

4. Haslett et al., 2021, in women

This randomized controlled trial in Brain, Behavior, and Immunity found that a regular gratitude practice reduced activity in the amygdala, a threat-detection hub, and markedly lowered the inflammatory cytokines TNF-alpha and IL-6, with effects appearing almost immediately after practice. The direction of cause is unknown. Huberman sees no biological reason the findings would not apply to men.

5. Voluntary versus forced running in mice

From the Robert Sapolsky conversation: a mouse that chooses to run on a wheel shows lower blood pressure and better neurochemistry, while a mouse whose linked wheel forces it to run the same amount shows rising blood pressure and stress hormones.

OTHER RELEVANT

1. Build one story and a few bullet-point cues

Choose a narrative that genuinely moves you: either a time someone sincerely thanked you, or someone else giving or receiving help. Write three or four bullet points capturing the state before the help, the state after, and whatever gives it emotional weight. Reuse the same story rather than hunting for new inspirational content each time, since repetition drives the plasticity.

2. Keep sessions short and do them three times a week

Once the story is set, read your cues and feel into the experience for 1 to 2 minutes, up to 5 if ambitious. Calming breaths such as physiological sighs can precede it but are optional. No study pins down frequency, so Huberman proposes about three times a week; time of day does not matter.

3. If you give thanks, make it real

A sincere letter, text or call of thanks is a powerful way to shift someone else's neurology, but reluctance or exaggeration undermines it, and the same rule applies to gratitude you try to manufacture for yourself.

4. Expect side benefits for empathy

Even brief practices engage the anterior cingulate cortex more robustly. Huberman's lab sees this region acting as a hub for primitive empathy in mice, so a narrative-based practice may also make you more attuned to others.

Time Perception & Entrainment by Dopamine, Serotonin & Hormones

Date: 2021-11-15 · Duration: 1:14:17
URL: https://www.youtube.com/watch?v=8IWDAqodDas

KEYPOINTS

1. Circannual rhythms run on melatonin, which tracks day length
Light hitting the eyes suppresses melatonin; flipping on a bright bathroom light at night can drop it close to zero. Because the brain averages light exposure across days, long spring days mean progressively less melatonin and short winter days progressively more. Melatonin also regulates testosterone and estrogen, which is why most (not all) people feel more energy in spring and lower mood and energy in winter.

2. Skin acts as a hormone-influencing organ that responds to sunlight
Huberman cites Parikh et al. in Cell Reports: across the year, people made more testosterone and estrogen in longer days, correlating with romantic desire, combativeness and overall mood. About 2 hours a day of sunlight on exposed arms, upper back, neck and face drove significant increases, even with cloud cover, and sunscreen did not appear to block it. He notes skin health and cancer risk still take priority.

3. Every cell carries a 24-hour gene–protein timer
Clock genes such as Per, Bmal and Clock are expressed, make a protein that shuts the gene off, and restart once the protein is used up, a loop that takes about 24 hours. Morning light, evening light and darkness at night keep these cellular clocks locked to the outside world. Huberman stresses that poor circadian entrainment is linked to higher cancer and obesity risk, mental health problems, slower wound healing, worse performance and hormone disruption.

4. Losing circadian cues degrades time perception at every scale
In Aschoff's classic 1985 isolation experiments, repeated many times since, people kept without clocks, windows or regular light underestimated their stay: after about 42 days they guessed 28 or 36. Their ability to count off short intervals such as 2 minutes, normally accurate within 5–15 seconds, also fell apart, and Huberman links accurate interval timing to task performance.

5. Focus comes in roughly 90-minute ultradian blocks that you can start whenever you choose
Nathaniel Kleitman's basic rest–activity cycle governs sleep and also waking focus. Sleep cycles are hardwired, but a waking work cycle starts when you decide it does. Regardless of who you are, focus drops off around 100–120 minutes, because acetylcholine, dopamine and norepinephrine release can't be sustained. Huberman says you shouldn't expect to drop into deep focus immediately.

6. Time perception comes in three modes
Present-moment perception works like an interval timer, either fine-slicing time or ticking slowly. Prospective timing is a stopwatch running forward, where you have to decide how many tick marks to set for, say, 5 minutes. Retrospective timing reconstructs the past from memory, such as working out the gap between lunch and dinner last week. Each mode is shaped by neuromodulators.

7. Dopamine and norepinephrine raise your perceptual 'frame rate', so you overestimate elapsed time
When drugs raise dopamine, people asked to mark one minute call it at around 38 seconds. Huberman compares this to filming at 4,000 instead of 30 frames per second: more frames make events look slower. Norepinephrine, which is made from dopamine, has a similar effect.

8. Serotonin lowers the frame rate, so you underestimate elapsed time
In human studies using serotonin-raising drugs and cannabis, people asked to mark 5 minutes let about 6 pass. Huberman says the evidence suggests dopamine and norepinephrine dominate the first half of the waking day and serotonin rises toward evening, with early evidence that people overestimate time passing in the morning and underestimate it later.

9. Trauma can 'overclock' memory
Extreme arousal pushes dopamine and norepinephrine so high that events are experienced in ultra-slow motion. The hippocampus stores both which neurons fired and the rate at which they fired, so these memories are stamped in at high resolution and are hard to shake. Huberman says treatments such as EMDR, exposure therapy, CBT and newer ketamine approaches partly work by giving the person control over how fast the memory plays back, which helps separate the emotional weight from the memory.

10. Dopamine release marks the boundaries of your experienced time bins
Dopamine signals both expected rewards and surprises, positive or negative. Huberman argues that how often dopamine is released sets how you carve up the day into segments, which turns habits into time markers as well as sources of motivation.

EXAMPLES

1. Basketball-viewing fMRI study (Anthony et al., 2020, Neuron)
People watching recorded games showed dopamine-related activity in the nucleus accumbens and VTA when their predictions came true and when they were surprised. How often these signals fired predicted how viewers divided the game's time into segments, more than the game clock or the action did.

2. Blinking resets time (Terhune et al., Current Biology)
The paper 'Time dilates after spontaneous blinking' showed each blink shifts time perception toward overestimation. Arousal and dopamine increase spontaneous blink rate, so blinking works like a camera shutter. Huberman suggests blinking less to slow perceived time and more to speed it up, while admitting you miss information when you blink.

3. Cold water and the long three minutes

Huberman cites a European Journal of Physiology study reporting that cold exposure raises baseline dopamine about 2.5-fold, a long-lasting increase that doesn't appear addictive. That dopamine rise is why three minutes in an ice bath feels endless: the discomfort is being recorded at higher resolution.

4. Amusement-park day vs dentist waiting room

A fun, varied, dopamine-rich day flies by in the moment but is remembered as long and full, as with a vacation recalled 6–8 months later. A boring dentist wait drags in the moment but shrinks to almost nothing in memory.

5. Three apartments in New York

In Huberman's thought experiment, a year in one apartment with 100 new experiences feels like a year. Living in three places with three times the novelty would feel much longer. The same applies to people: sharing several new settings with someone makes you feel you've known them longer, even if the total time is identical.

OTHER RELEVANT

1. Anchor your circadian clock with light, exercise and meal timing

View 10–30 minutes of bright light, ideally sunlight, within an hour of waking and again in the late afternoon or evening. Avoid sunglasses if it's safe to do so (glasses and contacts are fine) and minimize bright light of any color at night. Exercise at a roughly consistent time, within about ±2 hours day to day, and keep meals within a consistent window. The exact meal times matter less than the window.

2. Cap deep-work blocks at about 90 minutes and space them out

Remove distractions (phone away, sometimes internet off) and set a start time. Huberman recommends one or two blocks a day, three at most, separated by 2–4 hours, and says most people can't handle more than two. Email and messaging don't count as deep work.

3. Match the task to the time of day

Do precise, rule-bound work with right and wrong answers (math, accounting, musical scales, recipes, skill execution) earlier in the day, when you're a 'higher-resolution camera'. Save brainstorming and creative blending for the more serotonergic afternoon. Huberman calls this a broad-strokes framework, and notes that poor sleep blurs these daily phases.

4. Use habits as markers that divide your day

Place reliable, rewarding habits at set points, for example 8 a.m. and 10 a.m., so their dopamine release marks the start of distinct stretches of the day. In the cold, you can distract yourself from the slow-motion discomfort with a song, counting or a metronome ticking every 10 seconds. For further reading he recommends Dean Buonomano's 'Your Brain Is a Time Machine'.

Nutrients For Brain Health & Performance | Huberman Lab Podcast #42

Date: 2021-10-18 · Duration: 1:41:19
URL: https://www.youtube.com/watch?v=E7W4OQfJWdw

KEYPOINTS

1. Food builds the structural fat of your neurons
Neuronal membranes are made of structural fats, not the storage fat around the belly. They consist mainly of essential fatty acids and phospholipids, so what you eat literally provides the building blocks of the cells you think with. Since you don't replace most neurons over a lifetime, Huberman frames these nutrients as long-term maintenance.

2. Most people get enough omega-6 but not enough omega-3 (EPA)
He suggests at least 1.5 g and ideally 2–3 g of EPA a day, counting EPA itself rather than total fish oil. Sources include mackerel, salmon, herring, oysters, sardines, anchovies and especially caviar, with chia, walnuts and soy for non-fish eaters, as well as krill or algae oil. He cites literature that 1–3 g of EPA a day can improve mood on par with some antidepressants, and allow lower antidepressant doses.

3. Phosphatidylserine gives modest but real cognitive benefits
In at least three studies, 300 mg a day of this lipid-like compound improved cognition, and in at least five it slowed cognitive decline. The effects were statistically significant but not large. Meat and fish (and, oddly, cabbage) supply it, so regular fish eaters probably get enough; Huberman himself does not supplement it.

4. Choline feeds the acetylcholine 'highlighter' behind focus
Acetylcholine from nucleus basalis boosts activity in selected brain areas relative to their neighbors, which is the basis of focus. Hindbrain acetylcholine neurons support general alertness, and many Alzheimer's drugs target this pathway. Egg yolks are the top source, with potatoes, nuts, seeds, grains, fruit and some fish as alternatives. He suggests 500 mg to 1 g a day, supplementing if needed to reach 1–2 g.

5. Creatine is a brain fuel, especially if you eat no meat
A 2021 review (first author Roschel) found that 5 g a day of creatine monohydrate improves cognition in some contexts, most clearly in people who get no creatine from meat. There is emerging, not yet established, evidence that it may help mild depression through frontal circuits. Huberman cautions that water retention varies and that creatine may raise DHT, which could affect hair in sensitive people.

6. Anthocyanins in dark berries protect DNA and slow cognitive decline
Blueberries, blackberries and black currants are rich in them. Supplementation with blueberry extract reduced DNA damage and modestly slowed decline in elderly patients (Afzal 2019 review). For whole fruit, he cites about 60–120 g of fresh blueberries a day as enough to shift the system; whether the effect works on neurons directly or through inflammation is unclear.

7. Glutamine may protect cognition from low oxygen and curb sugar cravings
Glutamine supplementation has offset cognitive effects of altitude and oxygen deprivation. Huberman reasons it could matter for sleep apnea, which contributes to cognitive decline. Gut neurons that sense glutamine send satiety signals, which may reduce sugar cravings. Doses run from 1 to 10 g a day, with cottage cheese, meat, eggs, beans, cabbage and spinach as food sources.

8. Gut neuropod cells steer food choice below awareness
Diego Bohórquez at Duke characterized these cells in the gut lining. They sense amino acids, sugars and fatty acids, and signal through the nodose ganglion to trigger dopamine release, driving you to seek more of that food. Processed foods exploit this with 'hidden sugars' you can't taste (a point Robert Lustig emphasizes), but the same pathway can reinforce healthy foods like omega-3-rich ones.

9. Artificial sweeteners aren't simply good or bad; context decides
Huberman says sweeteners taken alone are not the problem. Consumed together with glucose-raising foods, they can teach the body to over-release insulin. He also mentions a Nature paper showing that certain sweeteners can disrupt the gut microbiome, with results that may differ between saccharin and sucralose.

EXAMPLES

1. Sucralose with carbs (Dalenberg et al., Cell Metabolism 2020)
In Dana Small's lab (Dalenberg et al., Cell Metabolism, 2020), consuming sucralose with carbohydrate, but not without it, impaired neural and metabolic sensitivity to sugar. Huberman also cites studies where diet soda drunk with food later triggered a larger insulin response to diet soda alone; in one study of children this led to pre-diabetic insulin responses and the study was halted. He does not call sweeteners bad, only context-dependent.

2. Huberman's own regimen
He takes 1–2 tablespoons of lemon-flavored liquid fish oil, or capsules when traveling, to reach 2–3 g of EPA, plus 5 g of creatine daily as 'insurance'. He takes 300 mg of alpha-GPC 2–3 times a week, early in the day because it is mildly stimulating. Cognitive-decline studies used 600–1,200 mg of alpha-GPC.

3. The belief-effect milkshake
Alia Crum's Stanford work gave people identical milkshakes labeled either as indulgent and high-calorie or as low-calorie. Insulin, glucose and satisfaction followed what people were told. Huberman stresses this is a belief effect, not a placebo effect.

4. Learning to like flavors paired with metabolism

Ivan de Araujo and Dana Small showed in mice and humans that a taste paired with something that raises glucose, and therefore brain metabolism, comes to be preferred through dopamine, even when the taste itself carries no calories.

OTHER RELEVANT

1. Keep diet drinks away from carb-rich meals

If you drink diet soda, do it apart from foods that raise blood glucose to avoid conditioning a larger insulin response.

2. Retrain 'meh' foods by pairing and belief

Eat neutral or mildly disliked healthy foods, such as kale or mackerel, alongside foods that fuel brain metabolism (or ketones if you follow a ketogenic diet), and actively tell yourself they're good for your brain. Huberman says this cannot override true disgust, but it can shift neutral foods over time.

3. Get probiotics from low-sugar fermented foods

Fermented foods such as sauerkraut support the gut microbiota that shape these signals. Capsule probiotics may lack the right strains and have been linked to brain fog in some reports.

4. Cover the basics: hydration, electrolytes and feeding timing

Sodium, potassium and magnesium are the ions neurons use to fire. From his time-restricted eating episode, start eating at least an hour after waking, stop at least 2–3 hours before bed, and keep the eating window at roughly the same times each day.

Effects of Fasting & Time Restricted Eating on Fat Loss & Health | Huberman Lab Podcast #41

Date: 2021-10-11 · Duration: 2:26:07
URL: https://www.youtube.com/watch?v=9tRohh0gErM

KEYPOINTS

1. When you eat matters, not just what or how much
Huberman acknowledges that calories in versus calories out still governs weight, but argues that timing independently affects liver health, bile-acid metabolism, energy expenditure, inflammation, brown fat and blood glucose. Eating around the clock keeps food-related inflammatory markers raised, while a defined fasting period lets them fall.

2. The famous 8-hour window came from mouse experiments, partly for practical reasons
In Satchin Panda's lab study, mice given unlimited high-fat food at any hour became obese and sick. Mice eating the same food and calories within an 8-hour window maintained or lost weight, improved health markers and even reversed some earlier damage. Huberman reveals the window was 8 hours largely because the work was so labor-intensive: someone had to add and remove food on schedule and even clear food that mice hid in their cheeks.

3. Two rules anchor the protocol: no food in the first hour after waking or 2–3 hours before bed
Drawing on Panda's review in Endocrine Reviews, which tabulates well over 100 human studies, Huberman calls these the non-negotiables. Ideally you'd avoid even 1 g of sugar before bed and spend about 8 hours in bed, because fasting around sleep is especially important for the repair benefits.

4. An early or midday window is ideal for health but hard to live with
Because fasting around sleep matters most, a window such as 10 a.m.–6 p.m. maximizes the benefits. Huberman calls it 'absolutely dreadful' for social and family life. Most people do better with something like noon–8 p.m., kept reasonably consistent, including on weekends, when a 9:30 brunch can quietly stretch the window.

5. For muscle, protein early in the day may help
Aoyama et al. (Cell Reports, July 2021), studying mice and humans, found that protein eaten early supported hypertrophy better through the clock gene BMAL, which regulates protein synthesis in muscle. This held whether training happened early or late. Huberman's suggestion is to still skip the first hour after waking but get protein before about 10 a.m. if muscle is a priority. He stresses that eating protein later in the day isn't bad.

6. Glucose disposal agents are powerful and need caution
Metformin (prescription) and berberine (over the counter, with nearly identical effects) can sharply lower blood glucose and shift you toward a fasted state. Huberman gets a splitting hypoglycemic headache when he takes berberine without carbohydrates. Responses vary widely between individuals and by time of day.

7. Movement after eating speeds the transition to the fasted state
A 20–30 minute walk after dinner speeds gastric emptying and glucose clearance. Studies on high-intensity interval training found that HIIT early in the day can raise blood glucose, while HIIT in the afternoon or evening lowers it, which can help you enter sleep less 'fed'.

8. Time-restricted eating may lower free testosterone
In a study of trained cyclists eating about 4,800 calories a day, compressing the same calories into 8 hours significantly decreased free testosterone. Huberman notes the impact depends on your starting level: a 10–20% drop matters more if you're already low.

9. Alternate-day fasting works but is hard to sustain
Eating one day and having very little (500–600 calories) or nothing the next has been found safe, with no bone loss, and can produce faster weight loss and lower glucose than time-restricted eating. But few people can sustain it, rebound effects haven't been studied, and it's hard to combine with heavy training or work. Huberman knows of no quality clinical studies of longer fasts for dementia.

EXAMPLES

1. Fat loss, specifically, after 60+ days
Panda's review describes metabolic changes after about 60 days of time-restricted eating that bias weight lost during a calorie deficit toward fat rather than other tissue. The mechanism involves increased hepatic lipase, a liver enzyme that breaks down fat, and reduced CIDEC, a molecule that inhibits fat breakdown. Huberman stresses there's no way to out-eat the system: this applies only when you're already in a deficit.

2. Fasting and the gut
Huberman cites data that time-restricted eating improves the gut microbiome and helps people with irritable bowel syndrome and other forms of colitis. He attributes this to effects on clock genes in the gut lining and its microbes.

3. Lemon, lime and cinnamon
Cinnamon is a mild glucose-lowering agent, and lemon or lime juice can lower blood glucose through acidity. Squeezing half a lemon or lime into water quickly takes the edge off feeling overwhelmed after something very sweet.

4. Artificial sweeteners and breaking a fast
Some evidence shows aspartame and sucralose cause a brief rise in glucose, then a dip below baseline, which may explain increased hunger. Data on stevia and monk fruit are sparse. Huberman doesn't think it's fair to say sweeteners break a fast and suggests testing your own response with a continuous glucose monitor.

5. Adherence beats theoretical equivalence

Huberman distrusts studies claiming several diets work equally well, because participants are paid or monitored and log their food. In real life, adherence differs enormously, so the best plan is the one whose timing you can actually stick to.

OTHER RELEVANT

1. Build your window from sleep outward

Start with about 8 hours in bed, add at least 60 minutes without food after waking and 2–3 hours before bed, then fit a roughly 8-hour eating window around your life. Shorter 4–6 hour windows are possible, but the 8-hour version is the best tested.

2. Shift your window gradually, then hold it

Panda's group recommends a transition of one week to 10 days, moving the feeding window by about an hour a day. Once it feels sustainable, keep it for at least 30 days and ideally indefinitely. Data from their 'My Circadian Clock' app study, where people log their eating times, support this.

3. Use a pinch of salt for fasting shakiness

Huberman suggests a pinch to half a teaspoon of sea salt in water when you feel lightheaded or shaky during the fasting stretch. Salt isn't a glucose-lowering agent, but sodium stabilizes blood volume, and neurons depend on electrolytes for signaling. Adding lemon or lime can lower glucose further, which may make shakiness worse for some people.

4. Use exercise timing strategically

A walk after dinner, or HIIT later in the day, helps clear glucose before sleep. If you're experimenting with berberine or metformin, don't take them without carbohydrates on board, and watch for headaches and other side effects.

Controlling Your Dopamine For Motivation, Focus & Satisfaction

Date: 2021-09-27 · Duration: 2:16:31
URL: https://www.youtube.com/watch?v=QmOF0crdyRU

KEYPOINTS

1. Dopamine is about motivation, craving and pursuit, not just pleasure
Huberman frames dopamine as the molecule of wanting and seeking. It is also essential for movement, which is why the loss of dopamine neurons causes Parkinson's and Lewy body dementia symptoms. It acts through two main circuits: a movement pathway and the mesocorticolimbic reward pathway, whose prefrontal component assigns meaning and subjective value to what you're doing.

2. What matters is peaks relative to baseline
Your sense of motivation depends on your tonic baseline and the peaks above it. After a big peak, dopamine falls below baseline, partly because the readily releasable pool of dopamine is depleted. Your dopamine history matters: how high your last peak was shapes how good the next experience feels.

3. Typical dopamine increases above baseline
Averages from animal microdialysis and human blood measures that Huberman cites: chocolate about 1.5x baseline; sex (pursuit and act) about 2x; smoked nicotine about 2.5x, briefly; cocaine about 2.5x; amphetamine about 10x. Running for someone who loves it is about 2x, but exercise you dislike may raise it little or not at all, because subjective enjoyment shapes release.

4. The pleasure-pain balance explains craving
Drawing on Dr. Anna Lembke's work, Huberman explains that every pleasurable peak is followed by a slightly larger dip below baseline, which we experience as wanting more. Chasing that dip with more of the same substance or behavior deepens the depletion. Huberman suspects some apparent ADHD is actually a lowered baseline from overindulgence.

5. Layering stimulants on activities raises the bar for enjoying them
Pre-workout drinks, energy drinks, favorite music and caffeine stacked on top of exercise or study produce a big peak. They also increase the number of conditions needed to enjoy that activity next time, until you need 'twice as much coffee and three times as much music' just to get out the door.

6. Caffeine modestly raises dopamine but upregulates its receptors
Huberman cites a 2015 study (Volkow et al.) showing regular caffeine increases the density of D2/D3 dopamine receptors, so you feel more of dopamine's effects. The caveat: that same upregulation appears to make MDMA more neurotoxic, so caffeine and MDMA are a dangerous pairing. Huberman notes the MDMA neurotoxicity literature itself is contested, including a retracted early Science paper.

7. Rewarding effort itself is the neural basis of growth mindset
Citing Stanford colleague Carol Dweck, Huberman argues you can train the prefrontal part of the reward circuit to release dopamine during friction and effort, not only at the goal. Focusing only on the end reward makes the process more painful and less efficient, and undermines your willingness to do it again.

8. Night light and melatonin may suppress dopamine
Huberman cites work associated with Samer Hattar and David Berson showing that bright light between about 10 p.m. and 4 a.m. can lower dopamine for days. He also cites a 2001 Nishiyama study finding a significant dopamine drop 60 minutes after melatonin. He agrees with Matt Walker that melatonin is generally not advisable except for jet lag.

EXAMPLES

1. Cold water raised dopamine 2.5x for hours
A European Journal of Applied Physiology study immersed people to the neck in water at 32°C, 20°C or 14°C for up to an hour. Adrenaline and noradrenaline rose immediately. Dopamine rose slowly from about 10–15 minutes and reached about 250% of baseline, comparable to cocaine's peak, but stayed elevated for up to three hours with no crash. Cortisol rose transiently, especially in the coldest water.

2. Mucuna pruriens is essentially L-DOPA
This velvet bean contains the direct dopamine precursor. Huberman cites at least five studies showing it can reduce Parkinson's symptoms much like L-DOPA, a couple showing it lowers prolactin, and four showing improved sperm count, quality and motility. The rise is intense and is followed by a crash, which is why Huberman personally avoids it.

3. L-tyrosine: the 1983 specificity study
A study in the Journal of Clinical Endocrinology and Metabolism compared tyrosine and tryptophan. Tyrosine raised dopamine within about 45 minutes, for roughly 30 minutes, while tryptophan raised serotonin instead, a specificity that argues against placebo. Typical doses are 500–1,000 mg. Huberman uses it occasionally (once a week, sometimes twice), never as a daily habit.

4. A listener's 30-day screen fast
Huberman describes a young man addicted to video games who, after the episode with Anna Lembke, quit his phone, games and social media for 30 days. By day 29 his concentration and mood were much better, though the first 14 days were very hard. This is how the releasable pool of dopamine replenishes.

5. Huberman's PEA and alpha-GPC stack
For occasional intense mental work, about once a week or every two weeks, he takes 500 mg phenylethylamine (also found in chocolate) with 300 mg alpha-GPC. It gives a sharp, transient lift of about 30–45 minutes that he finds smoother than

tyrosine and much milder than Mucuna. He stresses this is right for him and that you should check with your doctor.

OTHER RELEVANT

1. Randomize your rewards like a casino does

Intermittent, unpredictable reward schedules sustain motivation best. Before a workout or study session, flip a coin to decide whether to add music, caffeine or company. Keep big peaks rare, and vary the dopamine you get from activities you do often. A fixed schedule like 'every third time' doesn't work because it's predictable.

2. Use cold deliberately and safely

Showers, ice baths or cold streams all work, and the dopamine release follows whether you calm yourself, psych yourself up or distract yourself. Earlier in the day is better. The effect fades as the cold stops feeling novel and challenging. Avoid exposures long enough to cause hypothermia; the hour-long study had monitoring.

3. Recovering from depletion means abstaining

If your baseline has dropped from overuse of a behavior or substance, the path back is cold turkey or tapering, not more of it. Expect the first couple of weeks to feel worst.

4. Prescription and supplement cautions

Wellbutrin (bupropion) raises dopamine and norepinephrine and helps many people with depression or quitting smoking. It avoids SSRI sexual side effects but can blunt appetite and raise anxiety, so it must be dosed with a psychiatrist. People with schizophrenia, psychosis, bipolar disorder or anxiety should avoid Mucuna and tyrosine. Huperzine A raises acetylcholine and indirectly dopamine; Huberman hasn't tried it.

5. Dim lights at night, and consider yerba mate

Avoid bright light from roughly 10 p.m. to 4 a.m. to protect dopamine. Huberman notes a couple of studies suggesting yerba mate may protect dopamine neurons in damage models, while cautioning that more research is needed.

Psychedelics for Treating Mental Disorders | Dr. Matthew Johnson

Guest: Dr. Matthew Johnson
Date: 2021-09-20 · Duration: 2:52:05
URL: https://www.youtube.com/watch?v=GzvzWO0NU50

KEYPOINTS

1. Classic psychedelics act mainly on serotonin receptors, but chemistry doesn't predict the experience
Johnson groups LSD, psilocybin (found in more than 200 mushroom species), DMT and mescaline as classic psychedelics. Psilocybin resembles serotonin, yet mescaline structurally resembles dopamine and still produces a similar receptor-level effect. Huberman stresses that a molecule can trigger different parts of the same receptor's signaling pathway at different rates. That's why similar-looking compounds feel so different, and why people shouldn't try to 'cowboy their own chemistry.'

2. Hopkins-style sessions: screening, rapport, then a single high dose
Participants first undergo days of structured psychiatric interviews to exclude psychotic disorders and bipolar mania, plus cardiovascular screening. They then spend 4–8 hours of preparation building rapport with their guides. Early dose studies used placebo or 5, 10, 20 or 30 mg of psilocybin per 70 kg. Therapeutic work targets 20–30 mg (some people received 40–45 mg under weight adjustment), and the team has since dropped weight adjustment. The capsule takes effect in 15–60 minutes, and pulse and blood pressure are checked roughly every half hour.

3. Surrender, not control, seems to drive the benefit
Johnson tells participants that any emotion is welcome, even crying hysterically. That can be harder for experienced recreational users, whose party rule is to 'hold your shit.' He speculates that the reality-shattering phase, which can include losing one's sense of self, can be met by surrender, which tends toward transcendent experiences, or by clinging, which tends toward a bad trip.

4. Lasting change often looks like a shift in identity and agency
In his work with cancer patients who had cancer-related depression and anxiety, and with smokers who had repeatedly failed to quit, Johnson sees people step out of identities like 'I'm a smoker, I can't do it.' They report a supercharged sense of agency ('I'm just going to make a decision') and often say, 'I know this sounds like bullshit.' He contrasts this with ordinary advice to depressed people, which rarely sticks.

5. Ketamine works differently, and how it's delivered may matter
Spravato (esketamine nasal spray) is FDA-approved for treatment-resistant depression at fairly low, mildly psychedelic doses. Patients are told to ignore the altered state. Its antidepressant effect starts immediately but lasts about a week, whereas psilocybin effects have been seen a year or more later. Johnson points to Russian studies by Krupitsky in the 1990s–2000s that gave high-dose ketamine as psychedelic therapy and reported high success rates for heroin and alcohol addiction, and asks whether framing explains part of the gap.

6. The two big dangers: psychotic vulnerability and bad trips
People with schizophrenia, bipolar mania or a strong predisposition can be identified fairly reliably through a few hours of history-taking, and Johnson says psilocybin research in schizophrenia should be low on the list. The more common danger is a bad trip, which can happen to anyone at a high enough dose. Even in his lab, after the best preparation, about a third of people at roughly 30 mg report a stretch of intense fear, feeling trapped or 'losing their mind,' sometimes minutes before a beautiful experience.

7. Lasting perceptual effects exist but are rare and often confounded
Hallucinogen-persisting perceptual disorder is in the DSM: a very small percentage of users keep seeing halos or trails. Johnson notes that cases are clouded by unknown doses, purity and mixed drugs, and suspects a rare neurological susceptibility. He also argues the field historically blamed 'the weird other thing,' psychedelics, rather than alcohol or tobacco.

8. Microdosing is unproven and may carry its own risk
A microdose is roughly a tenth of an entry-level dose. For psilocybin that's about 1 mg. For LSD, whose psychedelic effects start around 100 micrograms, a common mistake is calling a 100-microgram dose a microdose. So far, studies haven't shown improved creativity, cognition or sustained mood, and none have tested the every-few-days schedules promoted by people like Paul Stamets. Johnson suspects there may be some real antidepressant effect, based only on anecdotes. He also flags that serotonin 2B activation (the mechanism behind fen-phen's heart-valve damage) is more worrying with repeated dosing over years than with a few therapeutic sessions.

9. Legal reform is moving, but approval isn't guaranteed
Johnson calls the assumption that everything will be legal in a few years premature. He distinguishes decriminalization from legalization and from regulated medical use, citing Oregon's state-level psilocybin therapy program, which must still work out how to coexist with federal law. If Phase 3 trials hold up, even at half the current effect sizes, he expected MDMA for PTSD and then psilocybin for depression to be approved within a few years.

EXAMPLES

1. The 'heroic dose' death in Oregon
Johnson keeps a growing file of people who panicked on psychedelics and were hurt or killed by running into traffic or falling. In one case, an 18-year-old in Oregon who wanted his 'biggest dose ever' ended up naked and disoriented in a neighbor's house and was killed by police, which Johnson calls an overuse of force.

2. Syd Barrett
Discussing psychosis risk, Johnson cites Pink Floyd's Syd Barrett, who heavily used LSD and showed a classic schizophrenia pattern. He adds that, as in many cases, there were hints of susceptibility beforehand. First psychotic breaks

and first drug use both peak in adolescence and early adulthood, which makes cause hard to untangle.

3. Survey reports of spontaneous change
Johnson's survey research includes people who took mushrooms recreationally and quit a 20-year smoking habit, or say it helped their depression or alcoholism. He notes efficacy rates are still higher with screening, preparation and support.

4. The Amsterdam truffle study
People who knew they were taking microdoses of psilocybin truffles showed small reaction-time shifts on cognitive tests. Johnson says these are just the effects you'd expect from being slightly high, which is why he insists on double-blind trials.

OTHER RELEVANT

1. Setting and support shape the outcome
Both men emphasize that the experience depends on the 'container': trusted guides, comfort, permission to let go and integration afterward. Johnson notes that the same high dose in a less-than-ideal environment raises the risk of a bad trip.

2. Screen honestly for personal and family psychiatric history
A personal or strong family history of psychosis or bipolar disorder is the main exclusion in trials. Heart disease is another, because psychedelics raise pulse and blood pressure.

3. Check dose units before taking anything
Micrograms versus milligrams is a common source of accidental full doses with LSD. Street products also vary in purity and may be mixed with other drugs.

4. To participate legally, look for clinical trials
Johnson points listeners to clinical trial registries (searching for psilocybin, MDMA or psychedelic turned up 40–50+ studies at the time) rather than unregulated use. Concussion and traumatic brain injury, which Huberman notes come largely from occupations like construction (jackhammers, for example) rather than from sports, is an emerging research target with a strong rationale but little data yet.

ADHD & How Anyone Can Improve Their Focus

Date: 2021-09-13 · Duration: 2:18:01
URL: https://www.youtube.com/watch?v=hFL6qRIJZ_Y

KEYPOINTS

1. ADHD is strongly genetic and unrelated to intelligence
ADD appears in the medical literature as early as 1904 and was renamed ADHD in the mid-to-late 1980s. If an identical twin has ADHD, the other's chance is up to 75%, compared with about 50–60% for fraternal twins and 10–25% when a parent has it. Huberman stresses that ADHD appears across every level of IQ, emotional intelligence and other kinds of intelligence. A family history raises risk but does not determine the outcome, and symptoms can be overcome.

2. The core problems are attention, impulse control, time and working memory
People with ADHD often hyper-focus on things they enjoy, which shows the capacity for focus exists but is hard to direct. They also struggle with time perception, run late, organize in 'piles' and have weak working memory. Huberman links hyper-focus on preferred activities to dopamine.

3. In ADHD, the brain's resting and task networks fire together instead of opposing each other
The default mode network, which Huberman describes as including the dorsolateral prefrontal cortex, posterior cingulate and lateral parietal lobe, is normally synchronized internally. Task networks, centered on the medial prefrontal cortex, suppress impulses. Normally the two are anti-correlated, like a seesaw. In ADHD, after poor sleep, or in subclinical cases, they are abnormally correlated, like a band where every instrument plays melody. With successful treatment or when people outgrow ADHD, they return to anti-correlation.

4. Under the low-dopamine hypothesis, neurons fire when they should stay quiet
When dopamine is too low in attention circuits, neurons fire out of turn, like musicians ignoring the rests. Since the 1940s–60s, people with ADHD have tended to self-medicate with lots of coffee, half a pack of cigarettes a day, cocaine or amphetamine, all of which raise dopamine. Young children with ADHD often show a strong preference for sugary foods, which also raise dopamine.

5. Stimulant drugs may teach the brain to focus
Ritalin (methylphenidate) and Adderall (an amphetamine) raise dopamine and norepinephrine. Huberman's framing is that they let children experience sustained focus so the circuits for focus can be trained, rather than acting as a permanent crutch. Modafinil and armodafinil are weaker dopamine reuptake inhibitors that also act on the orexin (hypocretin) system, which is disrupted in narcolepsy, so they are a milder alternative.

6. Attentional blinks: finding one target makes you miss the next
Huberman credits Daniel Goleman and Richard Davidson's account. In a Where's Waldo-style search, or when spotting the letters R and Z in a fast stream of numbers, people who detect the first target often miss a second one shortly after, because attention briefly shuts off during a small neurochemical 'celebration.' Children and adults with ADHD have many more of these blinks.

7. Physical eye blinks reset your sense of time and are controlled by dopamine
A Current Biology paper, 'Time dilates after spontaneous blinking,' shows that blinks reset time perception, like the clapper between takes on a film set. Higher dopamine makes people overestimate how long something lasted because they sample time more finely, while low dopamine leads to underestimation, which fits the habitual lateness seen in ADHD. Chronic cannabis users blink less, and the more years of use, the lower their blink rate.

8. Elimination diets and sugar: strong results with caveats
A Lancet randomized crossover trial of 100 children (50 per group at any time) used an oligoantigenic diet that removed foods each child had mild antibody reactions to. It reported large improvements in focus, impulsivity and fidgeting with p-values below 0.00001, but later reanalyses criticized the design. A pediatric neurologist friend of Huberman's says cutting simple sugars has a dramatic positive effect in many of her patients, which is a well-informed anecdote, not a trial.

EXAMPLES

1. 17-minute open-monitoring session
Sitting quietly with eyes closed and attending to breathing and body sensations, returning when the mind drifts, for about 15–20 minutes, done even once (17 minutes), significantly reduced attentional blinks in published studies. It is being explored for age-related cognitive decline too.

2. Visual fixation training in schoolchildren
In 'Improvement of attention in elementary school students through fixation focused training activity,' children first moved around to get rid of restlessness. They then fixed their gaze on a near target such as their hand for 30–60 seconds, then on farther points. Just a few minutes a day improved their attention to other kinds of information.

3. Huberman's armodafinil anecdote
While badly jet-lagged, he took half of a prescribed dose before a lecture and talked for four and a half hours without realizing it. He would not want to study or work in that state.

4. A pediatric neurologist's approach to medicating
His colleague, an MD-PhD who treats ages 3–21 and whose own son shows ADHD signs, sees more kids benefit than not from stimulants, provided the lowest possible dose is used and adjusted as the child matures. Huberman raises the question of waiting for puberty, when frontal executive circuits come online.

5. Smartphone limits

One study found adolescents needed under 60 minutes of smartphone use a day to avoid measurable attentional decline. Huberman suggests about 2 hours or less for adults, with or without ADHD.

OTHER RELEVANT

1. Omega-3s and phosphatidylserine for ADHD

Across 10 studies, the attention benefit appears above 300 mg a day of DHA. For mood, 1,000–2,000 mg of EPA is the target. Phosphatidylserine at 200 mg a day for two months reduced symptoms in children aged 7–12 in studies of 147 and 36 subjects, with a stronger effect alongside omega-3s. It has not been studied in adults. These support treatment rather than replace it.

2. Other focus compounds need medical supervision

Alpha-GPC increases acetylcholine. People typically take 300–600 mg for studying, and doses up to 1,200 mg a day spread across the day have been studied for age-related cognitive decline. Phenylethylamine (PEA) ranges from 100 to 1,200 mg and can cause euphoria or jitters. Noopept has been studied at 10 mg twice daily. Check with a doctor, especially if you have ADHD.

3. Know what non-prescribed stimulants really are

Esposito et al. in Frontiers in Bioscience reviews Ritalin, Adderall, modafinil and caffeine alongside cocaine, MDMA and street amphetamine, highlighting similar mechanisms and long-term risks. Taking Adderall without a clinical need is taking amphetamine.

4. Let kids move before asking them to sit still

The circuits that suppress reflexive movement mature only around ages 15–16. Recess, movement before focus work, and fidget tools all serve the same purpose.

Healthy Eating & Eating Disorders - Anorexia, Bulimia, Binging

Date: 2021-09-06 · Duration: 2:16:19
URL: https://www.youtube.com/watch?v=2XGREPnlI8U

KEYPOINTS

1. Nobody can define 'healthy eating' for every individual
Huberman stresses that no government, nutritionist or expert can prescribe one ideal eating plan. We can only measure outcomes such as liver enzymes, blood lipids, weight and performance, and food norms are heavily shaped by culture and family. What can be defined is clinically disordered eating, which is why he starts there.

2. Intermittent fasting mostly works because not eating can be easier than portion control
Satchin Panda's lab at the Salk Institute found that 4–12-hour feeding windows improved liver enzymes and insulin sensitivity in mice, with some supportive human data. Calories in versus calories burned still governs weight. There's no evidence that skipping breakfast is better or worse than skipping dinner, and if you fast, you still need fluids and electrolytes (sodium, potassium, magnesium) for your neurons to work.

3. Protein early in the day may build muscle better
A Cell Reports study in mice, with a crossover study in women (and earlier work in men), found that amino acids eaten early in the active phase, roughly 5–10 am in humans, were used better for muscle growth and strength than the same protein later. When the clock gene BMAL1 was knocked out, the effect vanished. It didn't matter when resistance training happened, and the study doesn't mean you should avoid protein later.

4. Anorexia is the deadliest psychiatric disorder and is largely biological
It affects about 1–2% of women (roughly ten times the rate in men), typically begins around puberty and is often diagnosed in the early 20s. Symptoms include muscle and bone loss, low heart rate and blood pressure, fine body hair (lanugo), loss of periods, and low testosterone or sperm. Huberman says its prevalence has stayed roughly stable since descriptions from the 1600s or earlier, and it appears even where food is scarce, so media imagery and perfectionism aren't the main cause, though genetics creates a predisposition.

5. Bulimia isn't caused by childhood sexual trauma
Meta-analyses don't support the stereotypes that people with anorexia are control-seeking perfectionists or that bulimia stems from early sexual trauma, though trauma can play a role. Both disorders have clear biological roots and can overlap. Diagnostic categories have expanded (EDNOS, OSFED, binge eating disorder, pica) partly because some people meet most criteria while still menstruating.

6. Appetite has accelerators and brakes
In the hypothalamus, AgRP neurons drive eating: destroying them abolishes appetite, and overstimulating them causes eating 'to the point of bursting'. POMC neurons act as a brake through melanocyte-stimulating hormone, which sunlight boosts; Huberman says this is one reason appetite is lower in summer. Body fat releases leptin to signal 'enough', and that signal is disrupted in obesity and some binge eating.

7. In anorexia, restriction becomes a rewarded habit
Joanna Steinglass's group at Columbia found that people with anorexia have a near-automatic sensitivity to the fat content of foods, and that food choice shifts into habit circuits (the dorsolateral striatum). Avoiding high-calorie food actually feels rewarding rather than like punishment, so reasoning about health damage, or removing thin imagery, doesn't work.

8. Anorexia raises cholesterol despite eating little
With little dietary fat, the liver overproduces cholesterol, which is needed to make sex hormones, often overshooting dramatically. Huberman notes this is a wrinkle in the idea that blood cholesterol simply reflects diet.

9. Bulimia and binge eating involve too little 'top-down' control
Binges can reach 10–30 times daily calorie needs within about two hours. Unlike anorexia, bulimia involves impulsivity, so the prefrontal cortex's top-down control is underactive. That's why SSRIs such as fluoxetine, ADHD stimulants and bupropion (Wellbutrin), which boosts dopamine and norepinephrine, can help. Purging damages the gut lining, microbiome and esophagus.

EXAMPLES

1. Spotting the face among coffee beans
People with anorexia find a face hidden among coffee beans faster than others. Researchers call this 'weak central coherence' (fixating on details and missing the whole). Combined with difficulty switching focus, it helps explain behaviors like pushing food around the plate and finding the one low-calorie item on the table.

2. Caltech's parking-lot study
Rooftop cameras showed staff parking in the same spot and walking almost identical routes every day, which Huberman uses to show how automatic habits are, including food-avoidance habits.

3. Deep brain stimulation for binge eating
Casey Halpern (formerly at Stanford, moving to the University of Pennsylvania) found delta-frequency oscillations in the nucleus accumbens linked to food reward in mice and humans. Targeted stimulation in an FDA-approved trial looks promising for severe binge eating disorder, and his team is recruiting.

4. When 'cheat days' resemble binge eating disorder
Huberman was told that bingeing at least once a month over two to three months would likely meet criteria, which by that definition includes some people with routine cheat days.

OTHER RELEVANT

1. Break the habit through interoception and family support

The most effective approach for anorexia appears to be CBT that teaches people to notice the internal cues leading into the habit (a quickening heart, hyperfocus), plus family-based models in which relatives learn the biology, stop condemning and gently point out habits. Relapse occurs in about 50%, often triggered by stress.

2. Shift exercise from breaking down to building up

Rather than banning exercise, some programs move people with anorexia from compulsive calorie-burning toward resistance training that builds muscle and bone, with food seen as fuel for that. Huberman notes fidgeting (NEAT) can burn 800–2,000 calories a day.

3. Wait for clinical trials on psychedelics and ibogaine

MDMA and psilocybin are being studied for eating disorders at Johns Hopkins and elsewhere, but Huberman has heard reports of visual snow, tics and insomnia after unsupervised use, and seizures after ibogaine. He urges waiting for trial data.

4. Get a professional diagnosis

Learning the symptoms is valuable, but take concerns about yourself or someone you know to a qualified clinician rather than self-diagnosing. Huberman says deaths from eating disorders are not far off those from car accidents.

Science of Stress, Testosterone & Free Will | Dr. Robert Sapolsky

Guest: Dr. Robert Sapolsky
Date: 2021-08-30 · Duration: 1:29:50
URL: https://www.youtube.com/watch?v=DtmwtjOoSYU

KEYPOINTS

1. Short-term stress helps, chronic stress harms, and the right amount is 'stimulation'
Sapolsky describes two curves. Over time, acute stress brings benefits (escaping the predator, sharper focus for a presentation) and chronicity is 'downhill from there'; most modern stressors, like 20 years of traffic or an abusive boss, are clearly chronic. The other curve is an inverted U: too little challenge is boredom, too much is stress, and the optimum, which we pay for with scary movies and roller coasters, is stimulation.

2. The amygdala decides whether arousal feels like excitement or terror
A racing heart and fast breathing produce roughly the same brain activation whether the event is wonderful or awful. The one difference is whether the amygdala is recruited; when it is, the experience is counted as adverse. Sapolsky calls it the checkpoint for valence.

3. Testosterone doesn't cause aggression; it turns up the volume on existing tendencies
Give the number-three monkey in a five-monkey hierarchy lots of testosterone and he fights more, but only with numbers four and five; he keeps deferring to one and two. In the amygdala, testosterone raises firing rates only in neurons that are already active and shortens their after-hyperpolarizations. It lowers the threshold for provocation rather than creating aggression.

4. Behavior drives testosterone more than testosterone drives behavior
Sexual activity and aggression raise testosterone, while levels beforehand barely predict behavior. Raising an adult's testosterone by 30% has essentially no effect on sexual behavior. After castration, sex and aggression drop but not to zero, and how much remains depends on prior experience, so social learning carries much of the behavior.

5. The challenge hypothesis: testosterone rises when status is threatened
John Wingfield proposed that testosterone promotes whatever behaviors maintain status. In baboons that means aggression. In an economic game where status comes from trustworthiness, testosterone made people more generous. Sapolsky's conclusion is that the problem in a violent society is how much status it hands out for aggression, not testosterone.

6. Testosterone breeds confidence, and sometimes overconfidence
In economic games it makes people more confident and therefore less cooperative, cocky and impulsive. Sapolsky speculates that this kind of altered risk assessment fed miscalculations like those that started World War I. Testosterone and dopamine are intertwined: testosterone boosts energy, alertness and motivation within minutes (glucose uptake into muscle rises), which is why replacement can help aging men. Rats will lever-press to infuse testosterone into the range that optimizes dopamine release.

7. Prenatal hormones organize the brain; adult levels mostly act as an on-off signal
The ratio of the second to fourth finger reflects fetal androgen exposure. It is visible on fetal sonograms and in other primates, but samples of around 1,000 people are needed to detect effects. Huberman was an author, as a Berkeley master's student, on Marc Breedlove's paper on it. Hormone levels during development make a big difference; adult fluctuations matter little.

8. Estrogen protects the brain and blood vessels, but timing is everything
Estrogen boosts hippocampal neurogenesis and glucose and oxygen delivery, protects against dementia and reduces oxidative damage to vessels, whereas testosterone worsens these. A large NIH trial of postmenopausal estrogen was stopped after it showed more cardiovascular disease, stroke and dementia. Sapolsky's explanation is that women started estrogen only after menopause was complete, by which time receptor patterns had shifted. Monkey studies that simply maintained ovulatory levels showed protection.

9. Control and predictability buffer stress, but only within narrow limits
A rat that thinks its lever reduces shocks gets fewer ulcers, even if the lever is disconnected. A warning light 10 seconds before a shock helps; one second before does nothing, and two minutes before makes things worse. A sense of control helps with mild to moderate stressors but adds guilt after catastrophes, so telling a refugee or someone with terminal cancer to 'take control' is, in his words, privileged heartlessness.

EXAMPLES

1. Voluntary versus yoked running wheels
One rat runs by choice; a second is forced to run whenever the first does. With identical muscle work, the first gets the benefits of exercise and the second the harms of severe stress. Sapolsky bets the yoked rat's amygdala is far more active.

2. Marathon winners whose testosterone falls
1980s studies found that a winner who finished three minutes slower than expected showed falling testosterone, while the 73rd-place finisher who expected to collapse by mile three had a large rise. Interpretation, a prefrontal cortex function, drove the hormone response.

3. Endocrine disruptors are real but unresolved
Sapolsky considers falling sperm counts and testosterone a real phenomenon, citing work such as Tyrone Hayes's frog studies and shrinking testicle size in crocodiles. Which toxins are responsible, at what doses, and whether the declines are large enough to matter remain open questions.

4. Baboon fieldwork and deep thinking
Sapolsky did about 90% of his insightful thinking during three months a year in an East African park, without electricity or

phone calls, sometimes going 12 hours without speaking.

OTHER RELEVANT

1. Pick a stress practice you actually like and do it almost daily

Meditation, mindfulness, exercise, prayer and gratitude all work on average, but only if the practice doesn't make you want to scream after 10 seconds. It needs about 20–30 minutes daily or every other day, not just weekends.

2. Deciding your well-being matters gets you 80% of the way

Sapolsky applies the 80/20 rule: carving out daily time is most of the benefit, just as depressed patients improve after merely booking an appointment. Be wary of anyone claiming their method is scientifically proven to beat the others.

3. Choose outlets and support carefully

Displacement aggression, taking stress out on someone weaker, does lower stress responses and causes much of the world's misery. Mistaking acquaintances for real support, or demanding support without giving it back, backfires.

4. Without free will, change is still possible

Sapolsky argues there is no room for free will, a view he develops in his book Determined: every behavior traces back to seconds-ago sensory input, hormones, fetal environment, culture and evolution. You can't change yourself by will, but circumstances, including learning that change is possible or reading about figures like Nelson Mandela, can change your brain toward optimism.

Understanding & Conquering Depression

Date: 2021-08-23 · Duration: 2:02:02
URL: https://www.youtube.com/watch?v=Xu1FMCxoEFc

KEYPOINTS

1. Major depression is common, disabling and different from feeling down
Huberman separates major (unipolar) depression from bipolar depression, which gets its own episode. Major depression affects about 5% of people and is the fourth leading cause of disability. Signs include grief, a newly low threshold for crying, guilt and anhedonia, where food, sex, exercise and socializing feel flat. He urges listeners to take any warning signs to a professional rather than diagnose themselves.

2. 'Anti-self confabulation' distorts how depressed people see their own progress
Like a person with dementia inventing stories about where they've been, a depressed person may tell themselves stories in which they are failing despite clear evidence otherwise. His example is an injured athlete who insists they are getting weaker while their physical therapist sees real improvement. The athlete explains it away by saying the parking lot was rearranged.

3. Depression also shows up in the body, in sleep and in cortisol
So-called vegetative symptoms run below conscious thought: constant exhaustion, waking at 3–5 a.m. and being unable to fall back asleep, disrupted sleep structure (slow-wave sleep normally comes before REM), and reduced appetite. One physiological signature is a cortisol peak that shifts from morning to around 9 p.m.

4. Three neuromodulators map onto different symptoms
He links low norepinephrine to lethargy and slowed movement, low dopamine to lack of motivation, and low serotonin to grief and shame. Drugs that mainly boost dopamine and norepinephrine avoid serotonin side effects but can cause anxiety or be habit-forming. Emotional and physical pain overlap through substance P, and substance P inhibitors have helped some depressed patients.

5. SSRIs make serotonin work better but do not create more of it
By blocking reuptake, drugs such as fluoxetine leave serotonin in the synapse longer. About two-thirds of people get some or full relief, while roughly one-third get none. The two-week delay before benefits appear suggests the drugs work through plasticity, either by forming new neurons in the hippocampus's dentate gyrus or by reopening critical periods, as Lamberto Maffei's group in Pisa showed in animals.

6. Hormones and repeated stress raise the risk
About 20% of people with major depression have low thyroid hormone, and psychiatrists sometimes prescribe thyroid medication. Childbirth, certain phases of the menstrual cycle and menopause also raise risk, so he suggests a blood panel that includes thyroid and cortisol. Risk climbs with each long bout of stress, especially after four to five, often surfacing months after a breakup or a hard stretch at school or work.

7. Genes such as 5-HTTLPR make depression more likely after stress, but don't guarantee it
Large studies, starting in New Zealand, found that people with certain versions of the serotonin-transporter gene 5-HTTLPR can become depressed after one or two major stressors instead of four or five. That makes learning to manage stress especially important for anyone with a family history.

8. Inflammation diverts tryptophan away from serotonin
Chronic stress raises inflammatory signals such as IL-6, TNF-alpha and CRP. These push the enzyme IDO to turn dietary tryptophan into kynurenine and then into quinolinic acid, which damages neurons and promotes depression. Lowering inflammation lets more tryptophan become serotonin. He suggests the late-night carb cravings common in depression may be an attempt to get more tryptophan.

9. Ketamine and psilocybin both seem to act through plasticity in cortical layer 5
Ketamine blocks the NMDA receptor, which puzzles him because NMDA activation normally drives plasticity. Yet a 2019 Science paper with Liston as senior author showed ketamine relieves symptoms by growing dendritic spines in the prefrontal cortex. Psilocybin acts at serotonin 5-HT2A receptors and may broaden lateral connections in layer 5. Ketamine works by distancing people from their experience, while psilocybin works by immersing them in it.

EXAMPLES

1. A 21-year-old caught in the pleasure–pain balance
Using Anna Lembke's model, Huberman describes a young man whose heavy use of video games and other high-dopamine activities left him needing hours of play just to feel okay. Everything else lost its appeal, a state experienced as depression and anhedonia. He is now in treatment to reset that system.

2. EPA matches SSRIs in many trials
Many studies find that at least 1,000 mg/day of EPA relieves symptoms about as well as SSRIs and can lower the dose of fluoxetine people need, for example from 40–50 mg. 2 g seemed to work even better. For heart health, studies suggest about a 9% improvement per gram of EPA. He notes his Scandinavian relatives take cod liver oil and eat fatty fish, especially in winter.

3. Creatine in a 2012 American Journal of Psychiatry trial
In a randomized, double-blind, placebo-controlled trial, creatine monohydrate boosted SSRI response in women with major depression. Other studies used 3–5 g, sometimes up to 10 g, per day and found greater phosphocreatine activity in the forebrain, possibly tied to NMDA receptors. Creatine has also worsened mania in people who were already manic.

4. JAMA Psychiatry psilocybin trial, May 2021

In a randomized trial by Johns Hopkins researchers including Matthew Johnson, Roland Griffiths and Patrick Finan, 50–71% of patients improved significantly after psilocybin-assisted therapy, depending on how long remission was tracked. Doses were about 20 or 30 mg per 70 kg of body weight, given in two sessions weeks apart. Whether the trip felt good or bad mattered surprisingly little, and microdosing doesn't appear comparable.

5. The ketogenic diet borrows from epilepsy treatment

Keto reduces seizures in many children with epilepsy by raising baseline GABA and shifting the balance between GABA and glutamate. Researchers are now studying it for keeping mood stable in both bipolar and major depression. He contrasts this with alcohol, which also boosts GABA but leaves the brain over-excitable as it wears off.

OTHER RELEVANT

1. Protect your dopamine baseline

Avoid repeatedly chasing huge dopamine spikes from activities or substances. If the system needs resetting, Lembke's approach is a 30-day complete break, followed ideally by not going back, especially with drugs.

2. Train the norepinephrine system

Deliberate cold showers, alerting breathwork and exercise keep the norepinephrine system tuned. He admits they won't cure major depression and that depressed people often lack the energy to do them.

3. Build a low-inflammation baseline

Get at least 1 g of EPA a day, checking the EPA amount on the label rather than total fish oil, and do 150–180 minutes a week of zone 2 cardio. Muscles that work rhythmically pull kynurenine away from the brain. He takes 1–2 g of EPA himself.

4. Never stop prescribed medication on your own

Supplements such as EPA and creatine may work alongside medication. Raise them with your doctor rather than swapping them in for prescribed drugs. Ketamine and psilocybin should only be used legally under clinical supervision.

Machines, Creativity & Love | Dr. Lex Fridman

Guest: Dr. Lex Fridman
Date: 2021-07-19 · Duration: 3:03:18
URL: https://www.youtube.com/watch?v=VRvn3Oj5r3E

KEYPOINTS

1. AI is a philosophy, a toolkit and a way of understanding our own minds
Fridman quotes Pamela McCorduck's description of AI as 'the ancient wish to forge the gods'. In practice, he says, it is a set of computational tools, and deep learning with artificial neural networks has driven most progress over the past 15 years. Disagreement in the field is loudest about high-level terms like 'intelligence' and fades as you get specific about architectures.

2. Self-supervised learning aims for machine 'common sense'
Supervised learning needs humans to label the ground truth: a whole image, a bounding box or a crisp outline around a cat. Self-supervised learning lets a system learn from unlabeled internet text or video, then learn new concepts from very few examples, the way a child learns 'cat' from one or two. Fridman calls this the big exciting frontier, partly because it could capture features of a cat that humans cannot put into words.

3. Self-play shows how learning happens at the edge of ability
Systems like AlphaZero improve by playing mutated versions of themselves that are slightly better. Fridman notes the same holds in martial arts: you improve by training with people a little better than you. David Silver told him they had not found AlphaZero's ceiling, which Fridman finds both exciting and terrifying if applied to domains that affect society. That is why he stresses value alignment.

4. Real-world AI improves by collecting its failures
Fridman describes Andrej Karpathy's 'data engine' for Tesla Autopilot. Cars in the field flag weird edge cases, which are sent back, labeled mostly by humans, used to retrain the system, and then the updated system is redeployed. He stresses that 'Full Self-Driving' is still semi-autonomous, and he is most interested in how flawed humans and flawed robots can work together.

5. Machines need a stated objective; humans invent their own
Every machine learning system optimizes a hard-coded objective (loss) function. Fridman points out that humans uniquely figure out objective functions for themselves. What looks like curiosity in AI is really the exploration–exploitation trade-off, a way to escape a local optimum, not pleasure in discovery. Huberman defines curiosity as interest in knowing something without attachment to the outcome.

6. Shared moments over time are the core of deep relationships
Huberman lists the variables of a relationship: time, shared wins, shared struggles and quiet time together. Fridman says current AI cannot remember shared moments, and this is the technical problem he most wants to solve. His example is a refrigerator that 'missed' your late-night heartbroken ice cream. He believes a system that remembered such moments would change how attached we feel to machines.

7. Fridman's dream: companion AI that serves long-term wellbeing, not engagement
He imagines a companion in every home, 'a family member, the way a dog is', but one that understands your language, successes and traumas. He also imagines an AI layer that guides you online by optimizing for each person's long-term growth and happiness rather than engagement. Trust would rest on people owning their data, being able to delete it and walk away at any moment, and transparency about how it is used: 'the possibility of a clean breakup' keeps people together.

8. For deep relationships, robots must be able to say no and even leave
Fridman argues that a robot has to be more than a servant to change you the way a friend does. It needs its own identity and goals and must be able to refuse. He expects robots to have rights eventually and says we will need to see them as entities that deserve respect.

9. Grappling builds honesty and intimacy
Fridman says 'the mat speaks only the truth'. Being submitted strips away ego, and that shared vulnerability bonds training partners. As a powerlifter deadlifting about 495 pounds, he was repeatedly submitted by 120–130-pound women at Balance Studios in Philadelphia, proof that technique beats strength. Huberman notes that neurons for sexual and affiliative behavior and for aggression are interspersed 'salt and pepper' in the hypothalamus.

EXAMPLES

1. Homer, Fridman's 200-pound dog
When Homer was dying of cancer about 15 years earlier, nurses could not carry him, so Fridman, then powerlifting, carried him to be put to sleep. He calls it his first real experience of death and of how short our time is.

2. Huberman on losing Costello
Recorded days after his bulldog died, Huberman describes a year-long decline: abscesses, testosterone treatment that helped his joint pain and sleep, a 'pharmacy' of medications, and finally spinal degeneration that left a hind leg without feeling. He says he wakes up crying each morning, and hopes people will take on Costello's toughness paired with sweetness.

3. Boston Dynamics and the 'breakup'
Fridman's private experiments give legged robots dog-like affection, but Boston Dynamics wants Spot kept away from people for industrial monitoring. He is moving to companies more open to human–robot interaction.

4. Hedgy the hedgehog

Fridman has given away nearly everything he owns three times, but a scowling thrift-store stuffed hedgehog survived in his laptop bag. It recalls the Soviet cartoon 'Hedgehog in the Fog' and an era that treated kids as able to handle life's weight.

5. Russian roots and the battle against cynicism

Fridman says finding beauty in suffering, shaped by war, starvation and broken Soviet promises, is 'a prerequisite for gratitude'. He also sees Russian cynicism toward big dreams like a podcast or robots as a brake on entrepreneurship.

OTHER RELEVANT

1. Prioritize unstructured time

At the memorial for Huberman's late graduate adviser, her daughters said what they treasured most was not the trips but unstructured time together. Fridman suggests that this kind of time quietly creates magical moments.

2. Long-form depth over quick hits

Fridman thinks the thing worth optimizing for, in relationships and media, may be 'long-form authenticity'. That means stitching together many small moments and long conversations rather than chasing big events or clips.

3. On partners and children

Fridman says his logical side says no to kids for lack of time, but he knows his life would be transformed and that successful people he knows are energized by their children. He sees choosing the partner as the harder part. Huberman relays a friend's advice: 'define the role, then cast the right person'.

4. Let loss deepen the love

Fridman encourages Huberman not to run from grief. Echoing a scene from 'Louie', he says the loss is part of what shows how much someone meant to you.

Maximizing Productivity, Physical & Mental Health with Daily Tools

Date: 2021-07-12 · Duration: 2:07:01
URL: https://www.youtube.com/watch?v=aXvDEmo6uS4

KEYPOINTS

1. Your wake time tells you your temperature minimum
Huberman writes down the time he wakes each morning, usually 6:00 to 7:00 a.m. Your body temperature is lowest about two hours before your average wake time, so someone who wakes at 8 a.m. has a temperature minimum around 6 a.m. You don't need a thermometer, only the timing. That anchor helps with shifting your clock for travel, scheduling meals and timing focused work.

2. A morning walk outdoors quiets the amygdala
Walking, running or cycling forward creates optic flow, images streaming past the eyes (or sound streaming past, for people with low vision). Huberman cites mouse work and a Journal of Neuroscience paper showing that lateral eye movements reduce amygdala activity and enhance fear extinction. For him the morning walk is about calm alertness rather than calories. Outdoors works better than pacing indoors.

3. Morning light times your daily cortisol pulse
Get outside without sunglasses, if safe: two minutes minimum, 10 better and 30 ideal, depending on brightness. Even an overcast sky delivers more light than bright indoor bulbs. This early, healthy cortisol pulse happens once a day regardless; light decides when, and you want it early. If you wake before sunrise, turn on bright lights and go out once the sun is up.

4. Delay caffeine 90–120 minutes after waking
Caffeine is a competitive antagonist at adenosine receptors. Adenosine, the sleepiness molecule, builds the longer you're awake and is low on waking. Drinking caffeine right away blocks receptors, and when it wears off in the early or late afternoon the accumulated adenosine produces a sharper crash. Huberman hydrates first, with 16 to 32 ounces of water and a little sea salt.

5. Morning fasting raises adrenaline for focus
Huberman usually eats nothing until about 11 a.m. or noon, drinking water and yerba mate or guayusa tea. Fasting raises epinephrine, which in its optimal range sharpens focus and learning. What 'breaks a fast' depends on insulin sensitivity, glycogen and recent meals: a grain of sugar won't, a tablespoon will. He says yerba mate and guayusa increase GLP-1, which supports fat mobilisation, while noting it is probably not as effective as cardio.

6. Work in 90-minute blocks during your rising-temperature window
Brains cycle through roughly 90-minute ultradian rhythms. Huberman sets a 90-minute timer, blocks the internet, turns his phone fully off and expects focus to flicker within the block. His best window is about four to six hours after the temperature minimum, on the steepest part of the morning temperature rise; with a 7 a.m. wake, that's around 9 to 11 a.m. People who are sharpest first thing should use that time instead.

7. Raise your screen and add low white noise
Looking down with drooping eyelids promotes sleepiness; looking straight ahead or slightly up promotes alertness, a two-way relationship. Put your screen at or above eye level. Low-volume white noise, ideally not through headphones, is supported by studies showing greater engagement of attention and memory areas and increased activity in dopamine-related regions.

8. Exercise about an hour, five days a week, in a 3:2 ratio
Keep sessions to roughly 60 minutes plus or minus 15, as hard training beyond an hour raises cortisol excessively; 45 to 50 minutes may be better for many. For 10 to 12 weeks, do three strength or hypertrophy sessions and two endurance sessions each week, then flip the emphasis while maintaining the other quality. He takes two rest days.

9. Eat for alertness by day and calm by night
Starches raise serotonin and bring sleepiness, so lunch is protein, vegetables and healthy fats, with modest starch only after training. Huberman says about 25% of people tolerate large carbohydrate loads without lethargy. Dinner is deliberately starch-heavy, such as pasta or rice, to support sleep. He avoids 5-HTP and tryptophan supplements because they caused him early-night waking.

10. Sleep needs a temperature drop and a cool room
Falling asleep requires a drop of one to three degrees in core temperature. A hot bath, shower or sauna paradoxically speeds it by triggering cooling. A cool, very dark room with warm blankets lets you shed heat during the night through the palms, feet and upper face, a mechanism described in work from Craig Heller's lab at Stanford.

EXAMPLES

1. Sleep supplements he mentions
Magnesium threonate or bisglycinate, 300–400 mg elemental, 30–60 minutes before bed; apigenin (the compound in chamomile), 50 mg about 30 minutes before; and theanine. These may help quiet thinking, but magnesium can upset the stomach, and he advises checking with a physician. He is not a fan of melatonin, which may help you fall asleep but not stay asleep.

2. Pre-training electrolytes and alpha-GPC
Before a fasted workout he takes about half a teaspoon of sea salt with a 99 mg potassium tablet, or an electrolyte drink. Occasionally he uses 300 mg alpha-GPC, which supports acetylcholine, for extra drive.

3. Post-lunch walk and hypnosis
A five- to 30-minute walk after eating improves nutrient use and gets more outdoor light. He then does a 10-minute hypnosis

script from the free Reveri app as non-sleep deep rest (NSDR), followed by a second 90-minute work block.

4. Nap rules
Keep naps to 90 minutes or less; 10–20 minutes is often better unless you slept poorly. Skip naps if they disrupt your night.

5. Middle-of-the-night waking
Use dim light only, get back to bed quickly, and try yoga nidra or a sleep hypnosis script if you can't drift off.

OTHER RELEVANT

1. Afternoon light protects against night light
Viewing late-afternoon sun, around 4–5 p.m. depending on season, partly buffers the harm of light between about 10 p.m. and 4 a.m., which data from labs including David Berson's link to disrupted mood, sleep and learning.

2. Bright light during the day is fine
Blue light is exactly what sets circadian rhythms, so don't block it in daytime. At night, dim and lower overall lighting rather than relying on blue-blockers.

3. Recovering from a bad night
Avoid going to bed very early the next evening; stay up close to your normal time to protect your rhythm. Keep wake and sleep times similar on weekends.

4. Cholesterol and sex hormones
Testosterone and estrogen are built from cholesterol, and Huberman eats butter in moderation, noting his own lipids are fine.

The Science of Hearing, Balance & Accelerated Learning

Date: 2021-07-05 · Duration: 2:03:36
URL: https://www.youtube.com/watch?v=JVRyzYB9JSY

KEYPOINTS

1. Short rests during practice speed up skill learning
A Cell Reports study from a lab led by a neuroscientist named Cohen (Huberman jokes, not the musician Leonard Cohen) had people practise a piano-key sequence (G-D-F-E-G) either continuously or in 10-second bursts separated by 10 seconds of doing nothing. Learning and retention were much faster with the breaks. Brain imaging showed the hippocampus and cortex replaying the sequence about 20 times faster during rest, which the authors call 'micro-offline gains.' It builds on the spacing effect Ebbinghaus first described in 1885.

2. The cochlea sorts sound by frequency like a prism
The pinna's shape amplifies high frequencies. Sound vibrates the eardrum and the three small bones (malleus, incus, stapes), which press on the fluid-filled cochlea. One end of the cochlea responds to high pitches and the other to low, much like piano keys. The auditory cortex keeps that order in 'tonotopic maps.' Hair cells lost to damage can't currently be replaced, though groups including some at Stanford are working on it.

3. Binaural beats change brain state, but they aren't learning magic
Huberman says the independent, non-sponsored research is surprisingly solid. Delta frequencies (1–4 Hz) help with falling and staying asleep, theta (4–8 Hz) brings on a meditative state, and higher frequencies, up to gamma (32–100 Hz), support alertness, focus and problem-solving. The strongest benefits are for reducing anxiety, including at the dentist, and reducing chronic pain (three good-quality studies). Effects on cognition, working memory and creativity are modest. Their value is simply in shifting your state.

4. Low-level white noise improves learning in adults, possibly through dopamine
An fMRI study found that low-intensity white noise improved auditory working memory, and a 54-subject study found that background noise helped as long as it wasn't too loud. A 2014 Journal of Cognitive Neuroscience paper showed white noise increasing activity in dopamine-rich midbrain areas (substantia nigra/VTA) and the right superior temporal sulcus. The idea is to raise baseline dopamine slightly, not to give yourself a 'favourite song' rush.

5. White noise may harm auditory development in infants
Work by Mike Merzenich and his student, done in young animals, found that constant white noise disrupted tonotopic maps in the auditory cortex. White noise carries no structured frequency information, unlike a voice. Huberman flags this as a reason to be cautious about running white-noise machines all night for babies, while noting the evidence comes from animals.

6. Focused listening can rewire the adult auditory cortex
Gregg Recanzone and Merzenich showed that passive listening changed little, but telling subjects to attend to specific frequencies or cues sped up learning and remapped the cortex in adults. This was some of the first evidence that adult brains can change. In practice, it means picking out particular words, keys or scales to concentrate on during each practice session.

7. Balance depends on the inner ear, vision and the cerebellum working together
The three semicircular canals detect head rotation, and the cerebellum combines that with visual and body-position information. Vision and balance drive each other, which is why standing on one leg with your eyes closed causes so much postural sway. Huberman notes that the cerebellum's non-motor outputs connect to serotonin and dopamine systems, which may partly explain why balance-heavy activities feel good.

8. Leaning while accelerating trains the vestibular system best
The vestibular system responds to acceleration and head tilt, not just position. Moving forward while tilted relative to gravity, as in carving on a skateboard, surfboard or snowboard or leaning a bike into a turn, challenges it in a way that staying upright, or even balancing on a gym ball, doesn't.

EXAMPLES

1. Tinnitus supplements with some evidence
Huberman found four supplements studied without obvious commercial bias. Melatonin, about 3 mg a day for 30 days to 6 months, produced modest but significant reductions across four studies of 30 to 100+ participants. Ginkgo biloba had 'limited evidence,' mostly for age-related tinnitus (one study with 978 people). Zinc at 50 mg elemental was tested in one double-blind study of 41 people. Magnesium at 532 mg elemental was tested in a single phase 2 trial of 19 people. He's not personally a fan of melatonin for sleep and says to talk to your doctor.

2. The ear-size age formula
Ears keep growing throughout life, faster in later years, partly because of changes in collagen. Huberman describes a published formula: measure each ear's outer circumference in millimetres, average the two, subtract 88.1 and multiply by 1.96 to estimate biological age.

3. Salt and lightheadedness
Huberman distinguishes dizziness (the world spinning) from lightheadedness (feeling like you'll fall). Family members who believed they had blood-sugar problems, with shakiness, lightheadedness and nausea, were helped by adding a little sea salt to their water. He says this won't fix every case.

4. Bats and the Doppler effect
Bats emit sounds and read how quickly the echoes return, and how the timing changes, to tell whether they're approaching an object. They build an acoustic picture of trees, buildings and people.

OTHER RELEVANT

1. Add 10-second pauses when you practise

While practising a skill, alternate short bouts of reps with 10 seconds of doing nothing: no phone, eyes closed if you like. Afterward, add a 20-minute nap or quiet rest. Huberman suggests the two may work together, though that combination hasn't been tested.

2. Keep background noise low

If you study with white noise, keep it audible but unobtrusive, roughly the lower third of the volume dial, and even quieter through headphones, which make sound feel as if it's inside your head. If your attention can 'disappear into the work,' the volume is about right. Avoid two-hit exposures, like loud headphones followed by a concert, which damage hair cells.

3. A few minutes of balance training

Stand on one leg and shift your gaze from about two feet away, out to the farthest point you can see, then back in. Or keep your gaze fixed while changing posture. Two to ten minutes a few times a week is enough, and single-leg or asymmetric positions work best.

4. For motion sickness, look ahead but don't fix your gaze

Get up on deck or look out the front windshield, but let your eyes move with the motion instead of locking onto one point on the horizon. Phones, seat-back screens and dividers separate what you see from what your inner ear feels. Driving helps because you also get feedback from your own body.

How to Build Endurance in Your Brain & Body

Date: 2021-06-07 · Duration: 2:05:30
URL: https://www.youtube.com/watch?v=VQLU7gpk_X8

KEYPOINTS

1. Quitting is decided by neurons, not by a '90% mental' split
Huberman cites a Cell paper in which subjects pushed toward a goal while a virtual environment made their effort look futile. Neurons in the locus coeruleus release epinephrine as an effort signal. Glial cells track that release, and at a threshold they shut it off, which is the moment of quitting. When epinephrine release was extended, subjects kept going. He calls the 'mental versus physical' debate meaningless: endurance is 100% nervous system.

2. Five systems limit endurance: nerves, muscle, blood, heart and lungs
Neurons need glucose (or ketones if fully keto-adapted) plus sodium, potassium and magnesium, because action potentials and the sodium-potassium pump depend on ATP and the right pH. Muscle burns phosphocreatine and stored glycogen, and its ATP production is temperature-sensitive. Blood carries glucose, fatty acids and oxygen; the heart moves it and the lungs bring in the oxygen. The episode draws heavily on exercise physiologist Dr. Andy Galpin.

3. Muscular endurance: 3–5 sets of 12–100 reps with no major eccentric load
Muscular endurance fails at the muscle, not the cardiovascular system; push-ups are the classic example. The protocol is 3–5 sets of 12–25 reps (up to 100), resting 30–180 seconds and going to or near failure. Planks or wall sits of 1–2 minutes also work. Avoid slow lowering phases and jumping or deceleration, since eccentric work drives soreness and damage. Push-ups should touch the chest to the floor. Isometrics also build the postural endurance that 'text neck' erodes.

4. Long-duration endurance: one continuous bout of 12+ minutes builds efficiency
Long-duration work below maximal oxygen uptake builds efficiency of movement and mitochondrial density, so you make more ATP for the same effort and burn less fuel overall. It also builds new capillary beds in muscle; Huberman compares this to swapping a single hose for a sprinkler system. That is why a run that ended at 20 minutes feels easier the next time.

5. Anaerobic HIIT: 3–12 sets pushing above VO2 max
Work-to-rest ratios run from 3:1 (30 seconds on, 10 off) to 1:5 (20 seconds on, 100 off). The shorter rest suits low-skill movements like assault bikes; the longer rest preserves form with kettlebells or loaded squats, where reps degrade and injury risk rises. Start with about three sets once or twice a week and add a set or two weekly. It improves mitochondrial respiration and the neurons' ability to recruit muscle, which helps with repeated sprints in field and racquet sports.

6. Aerobic HIIT works best at a 1:1 work-to-rest ratio
An example is running a mile in about seven minutes, resting seven, and repeating for four or more miles of work. Huberman says many people use this to complete half marathons or marathons without having run the full distance in training. It trains nearly all the energy systems at once.

7. Intense intervals strengthen the heart and support the brain
The extra blood returned to the heart during repeated hard efforts eccentrically loads the left ventricle, increasing stroke volume and lowering resting heart rate. That delivers more glucose and oxygen to muscle and brain, including the hippocampus. Huberman says the brain benefits come through vascularization and factors like IGF-1, not from new neurons. Strength and hypertrophy work has been studied less for the brain and does not produce the same stroke-volume gains.

8. Breathing can be trained as a gear system
Nasal breathing filters air and is more efficient. Following Brian McKenzie's gear model, do long-duration work through the nose and add mouth breathing as intensity climbs, exhaling on the effort. Galpin's lab found that warming up the intercostals and diaphragm before endurance work lets you breathe more deeply and deliver more oxygen.

9. Hitting 'the wall' can mean over-relying on one fuel
Briefly speeding up, not to an all-out sprint, can shift muscles toward phosphocreatine or another mix of lipids and carbohydrate. Huberman notes that elite athletes now carb-load and also take exogenous ketones during long races, because the body is built to use multiple fuels at once.

10. Visual focus is a performance tool, which is why pacers are restricted
Narrowing your gaze to a point activates alertness circuits, including the locus coeruleus, while panoramic vision relaxes you. Run hard to a landmark, then widen your gaze to recover, rather than chaining milestones nonstop, which drains more energy. Visual pacers often invalidate record times, and a runner being passed can suddenly find a 'kick', as with Steve Prefontaine.

EXAMPLES

1. Huberman's futile Pacific swim
Swimming south against a current, he looked left and saw the same hotel after 20 minutes of effort. This real-world version of the futility experiment illustrates how lack of progress pushes you toward quitting.

2. Dehydration costs 20–30% of capacity
You lose about 1–5 pounds of water per hour of exercise. Losing 1–4% of body weight in water cuts work capacity by roughly 20–30% and also impairs thinking. Huberman warns that drinking far too much water without electrolytes can be lethal.

3. The Galpin equation
Divide body weight in pounds by 30 to get the ounces of fluid to drink every 15 minutes of exercise; adjust upward for heavy sweating. Above about 70% of VO2 max, gastric emptying slows, so build up the ability to drink during intense work by starting with small sips.

4. Fixing a side stitch
A side stitch is usually referred pain from the phrenic nerve, which drives the diaphragm and branches near the liver. Huberman relieves it with repeated physiological sighs: a deep inhale, a second sneaked-in inhale, then a long exhale.

5. The CO2 tolerance test for recovery
Take four breaths in and out, then a big inhale and a slow, controlled exhale. Sixty seconds or more suggests your nervous system has recovered; under about 45–60 seconds suggests a rest day may help.

OTHER RELEVANT

1. Stop deliberating and just schedule it
Ruminating over whether and when to train burns neural energy, glucose and epinephrine, possibly as much as the workout itself. Huberman is not a 'just do it' advocate, but recommends deciding cleanly.

2. Space sessions and protect recovery
Allow at least 4–6 hours, ideally 24, between different workouts, and take one or two full rest days a week. Avoid ice baths within about six hours of strength or hypertrophy work. Cold after endurance work may boost mitochondrial adaptations, though this is still debated. Finish each session with at least five minutes of slow nasal breathing with long exhales, or lying down, to downshift. To maintain muscle, do at least five sets per muscle per week.

3. Supplements with modest roles
Caffeine improves endurance and power output, though one study suggests it may inhibit the creatine system. Magnesium malate reduces delayed-onset soreness (it is different from the forms used for sleep). Beet-based nitric oxide boosters and beta-alanine help some people, but beta-alanine can cause a tingling, niacin-like flush.

Science of Muscle Growth, Increasing Strength & Muscular Recovery

Date: 2021-05-31 · Duration: 2:04:20
URL: https://www.youtube.com/watch?v=XLr2RKoD-oY

KEYPOINTS

1. The 'burn' isn't lactic acid: lactate fights it
Huberman says humans make lactate, not lactic acid. Lactate buffers the acidity you feel as the burn, serves as fuel for continued contraction, and acts as a hormone-like signal to the heart, liver and brain, partly by improving astrocyte function in the brain. He recommends reaching that burn safely for about 10% of training, and breathing deeply through it rather than holding your breath, since these lactate effects depend on oxygen.

2. Exercise helps the brain through blood-borne signals, not new neurons
Exercise reliably boosts neurogenesis in mice, but Huberman says human evidence is weak beyond, possibly, the hippocampus's dentate gyrus. The benefits more likely come from factors like IGF-1 and lactate supporting existing connections, which he argues may be preferable, since circuits struggle to integrate brand-new elements.

3. Henneman's size principle doesn't require heavy weights
Motor units are recruited from low to high threshold, using the minimum needed, and more are recruited as effort continues. So the high-threshold units that drive adaptation can be reached with loads anywhere from about 30% to 80% of your one-rep max, taken to or near failure. Heavier loads (75–90%) bias toward strength; lighter loads with more reps bias toward hypertrophy.

4. Muscles adapt to stress, tension and damage by thickening myosin
Huberman compares myosin filaments to a disorganized bouquet of balloons on strings of different lengths. Adequate stress, tension or damage triggers synthesis of more myosin, so the 'balloons' get bigger and the muscle grows thicker. He credits Andy Galpin and Brad Schoenfeld for much of the episode's framework.

5. Strength means distributing work; hypertrophy means isolating it
The nervous system naturally spreads effort across muscles for efficiency. Getting stronger is about moving progressively greater loads with many muscles working together. Hypertrophy depends on hard, localized, almost painful contractions of a specific muscle. If you can voluntarily contract a muscle hard without any weight, it likely has good growth potential.

6. About five sets per muscle per week maintains it; more builds it
For relatively untrained people, 5 sets per muscle per week is roughly the maintenance minimum, and 10–15 (up to 20) sets drive gains. Trained lifters may benefit from up to 25–30 sets. Muscles you contract easily need fewer sets; hard-to-activate muscles need more. Sets can be split across sessions.

7. Take about 10% of sets to failure; stop the rest near it
Most sets should end close to failure, so you can accumulate volume without overtaxing the nervous system. Sessions of about 45–60 minutes are recommended, since longer, intense sessions tilt toward cortisol and inflammation. Repetition speed between 0.5 and 8 seconds doesn't seem to matter for size or strength. Moving loads as fast as is safe builds explosiveness, mainly through neural changes.

8. Some common habits can blunt your gains
Huberman cites emerging data that whole-body cold within about four hours after resistance training may interfere with mTOR and other pathways that build muscle, even though it reduces soreness. Antihistamines and NSAIDs taken within about four hours before or after training may also dampen the useful inflammatory signal and mask pain. Inflammation during and right after training is part of the stimulus.

9. Hard training can temporarily dull thinking
Per Galpin, intense sessions of 30–60 minutes, or interval-heavy runs, reduce brain oxygenation afterward. On the upside, training at a regular time conditions the body's clocks to expect focus then, so non-training days at that hour are good for demanding cognitive work.

EXAMPLES

1. Duncan French's testosterone protocol
Six sets of 10 reps on big compound lifts with exactly two minutes of rest raised serum testosterone; 10 sets of 10 did not and leaned catabolic. French suggests doing it at most twice a week.

2. Morning recovery checks
Track your grip strength (with a hard rubber ring or by squeezing a floor scale) against a well-rested baseline; a 10–20% drop is a warning sign. For the CO2 discard test, take four deep breaths, then a fifth full inhale, then exhale as slowly as possible and time it. Under about 25 seconds suggests incomplete recovery, 30–60 seconds is a green zone, and 65–120 seconds indicates full systemic recovery. A 15–20% drop from your usual time is a cue to ease off.

3. Between-set tactics
Flexing a target muscle between sets aids hypertrophy but hurts performance on the next set. Pre-exhausting with an isolation move (leg extensions before squats) targets the muscle at the cost of the compound lift. Rest 2–6 minutes for strength and size. Palmar cooling can preserve reps across sets. A few physiological sighs between sets, and five minutes of downregulation at the end, start recovery.

4. Supplements discussed
Creatine: about 5 g a day for a 180-lb person (10–15 g if heavier, 1–5 g if lighter), with no loading needed. Huberman notes it can raise DHT and, in some men, hair loss. Beta-alanine (2–5 g) is for 60–240-second efforts. Arginine and citrulline may aid

long efforts but can trigger cold sores. For inflammation, Galpin's trio is more than 1,000 mg EPA a day, vitamin D and magnesium malate. Check with a doctor first.

OTHER RELEVANT

1. Don't neglect electrolytes

Sodium, potassium and magnesium let nerves fire and drive muscle. Needs rise with heat, sweat, caffeine and diuretics, and plain water alone won't cover them.

2. Aim for leucine-dense protein two to four times a day

Huberman suggests 700–3,000 mg of leucine per meal, ideally from whole foods. Animal proteins are denser per calorie, and plant-based eaters may consider leucine supplements. He suggests a 10–15% calorie surplus if gaining muscle is the goal.

3. Pick a consistent training time

Results for size and strength don't depend much on the time of day, though afternoon may favor performance. Huberman suggests 30 minutes, 3 hours or 11 hours after waking. Then run one- to six-month experiments to find what works for you.

How to Lose Fat with Science-Based Tools

Date: 2021-05-24 · Duration: 1:53:54
URL: https://www.youtube.com/watch?v=GqPGXG5TlZw

KEYPOINTS

1. Calories in vs calories out still rules, but the nervous system controls the 'burn' side
Huberman's first project as an undergraduate was thermogenesis, testing how MDMA, antipsychotics, antidepressants and diet drugs changed body temperature and metabolism. His framing: fat is fuel for the body's furnace, and neurons can turn that furnace up, which helps explain why some people eat a lot without gaining fat.

2. Set the foundation before any fat-loss tool
Huberman's foundation list: quality sleep and well-timed light exposure; more than 1,000 mg of EPA a day (which may mean taking more total omega-3s) from food or supplements; glutamine, fermented foods (a serving or two daily) and amino acids, which can quiet sugar cravings; and enough, but not too much, iodine and selenium for thyroid function.

3. Fat loss has two steps: mobilization, then oxidation
Fatty acids must first be released from fat cells into the bloodstream, then carried into mitochondria and converted to ATP. If they are mobilized but not oxidized, they can be re-stored as fat. Both steps are promoted by epinephrine (adrenaline), while high insulin inhibits oxidation.

4. Adrenaline for fat loss comes mainly from nerves wired into fat, not the adrenals
Sympathetic neurons send axons directly into fat pads and release epinephrine locally. That's why Huberman calls adrenaline 'the final common path' and effector of fat loss for every kind of movement, from shivering to barbell lifts. He recommends Bartness's review, 'Neural innervation of white adipose tissue and the control of lipolysis' (Frontiers in Neuroendocrinology).

5. Fidgeting (NEAT) can burn a striking amount of energy
Rothwell and Stock in England (1960s–70s) studied people who overate without gaining weight and found they were fidgeters: knee-bouncers with angular, 'electric' movements. Huberman cites figures of 800–2,500 extra calories a day from this non-exercise activity thermogenesis, working best in people who are somewhat overweight. It doesn't replace exercise's cardiovascular benefits.

6. Shivering itself, not just cold, drives brown-fat thermogenesis
A Nature paper showed shivering muscle releases succinate, which activates brown fat thermogenesis and may, over time, convert beige fat into brown fat. If you stay calm and suppress the shiver in cold water, you short-circuit the effect. Succinate is being explored as an obesity drug; irisin, by contrast, he calls underwhelming.

7. Cold adaptation works against fat loss
Because the cooling-and-rewarming transition triggers shivering, staying in as long as possible teaches the body to stop shivering. Polar bear club swimmers get plenty of cold but are often not especially lean. Ice packs on the neck or cooling underwear aren't good fat-loss strategies either.

8. Fasted training helps fat oxidation after a switch point
In moderate-intensity (zone 2) exercise, about 90 minutes in, people who ate 1–3 hours beforehand burn far less fat from then on than those fasted for 3+ hours. Doing 20–60 minutes of high-intensity work like sprints or lifting first moves that switch point earlier. The key variable is low insulin; if you can't train without eating, eat.

9. High-intensity work burns more fat afterward, low intensity burns more during
Sprints and weights mainly use glycogen during the session, but elevated post-exercise oxygen consumption, which can last up to 24 hours, oxidizes a higher percentage of fat afterward. Long bouts of low or moderate intensity show the reverse pattern.

10. Local adrenaline makes spot reduction plausible in principle
Spot reduction was largely dismissed as an infomercial myth. Because epinephrine is released locally at fat pads, Huberman argues that exercise, shivering or NEAT that activates those specific nerves could, in theory, mobilize fat from targeted sites. He frames this as an emerging possibility, not a proven protocol.

EXAMPLES

1. Dinitrophenol (DNP)
Women painting munitions in WWII factories licked their brushes and lost large amounts of weight. The compound, DNP, later spread among bodybuilders and models, but it is deadly through hyperthermia and many have died. Huberman strongly discourages anyone from trying it.

2. Alia Crum's hotel housekeepers
Housekeepers told in detail that their daily work met activity guidelines and benefited heart health and weight lost significantly more body fat and improved waist-to-hip ratio over several weeks than a control group, simply because of what they believed.

3. Ephedrine and fenfluramine
Both increased fat loss through adrenergic pathways and were pulled from the market. With ephedrine, Huberman says, people died of overheating rather than direct heart attacks; fenfluramine lost FDA approval over cardiovascular deaths.

4. Huberman's yerba mate habit
Raised on mate as an Argentine, he brews 16–30 oz, sips it through the day and especially before training, reusing the

leaves for about a day to extract more. Studies summarized on Examine show increased fat oxidation during exercise and at rest via GLP-1, and one study even shows a slight drop in heart rate. Guayusa from Ecuador is a sweeter alternative.

5. Gardner Lab diet comparisons

Stanford work shows low-fat, high-fat, keto and intermittent fasting produce similar weight loss when people stick to them, so adherence is the decisive factor. Huberman personally eats low-carb by day and carbs at night to help him sleep.

OTHER RELEVANT

1. Shiver-based cold protocol

Get medical clearance first. One to three (up to five) times a week, find water just cold enough to make you shiver, anywhere from 60°F to the high 30s depending on adaptation. Get in until you genuinely shiver, stay about a minute, get out for 1–3 minutes without drying off, then repeat for several rounds. Very cold water can shock the heart.

2. Caffeine before training

If you're already caffeine-adapted, 100–400 mg taken 30–40 minutes before exercise can increase the share of fat oxidized. If you're not used to it, a big dose can vasoconstrict and impair performance.

3. Compounds that lower insulin or aid oxidation, with caution

Berberine and metformin powerfully lower blood glucose and insulin, but Huberman urges caution. Semaglutide and other GLP-1 drugs are prescription-only 'heavy artillery'. Acetyl-L-carnitine modestly aids fat oxidation and has other effects, including on sperm quality, CRP and HDL.

4. Behavior before pills

Huberman insists there is no magic pill. Fidgeting, shivering, fasted or high-intensity training and diet adherence come first; compounds are add-ons that work mainly by increasing epinephrine or lowering insulin.

How Hormones Shape Sexual Development

Date: 2021-04-05 · Duration: 1:38:23
URL: https://www.youtube.com/watch?v=J7SrAEacyf8

KEYPOINTS

1. Biological sex develops in several layers
Huberman separates chromosomal sex (XX, XY, and variants such as XXY and XYY), gonadal sex (testes or ovaries), hormonal sex, and morphological sex (the shape of the body and genitalia). Each is a separate step, and gender identity sits further along with major social influences. He asks listeners to set aside cultural meanings of 'masculine' and 'feminine' and focus on the biology.

2. The Y chromosome works mainly by suppressing the female pathway
Genes on the Y chromosome encode Müllerian inhibiting hormone, which blocks formation of the Müllerian ducts that would become female reproductive structures. Genes such as SRY drive testes formation. The placenta also produces hormones, and the mother's adrenal glands make testosterone, so a maternal tumor that secretes testosterone can partly masculinize an XX fetus, for example by enlarging the clitoris.

3. Sex steroids act both quickly and slowly
Testosterone and estrogen can signal at the cell surface within moments, including fast effects on the brain. Because they're fat-soluble, they can also pass through cell and nuclear membranes and switch genes on or off. These gene effects are what permanently shape tissues during development.

4. DHT, not testosterone, builds the penis in the womb
In the fetus, the enzyme 5-alpha reductase converts testosterone into dihydrotestosterone (DHT) in the genital tubercle, and DHT drives penis development, a primary sexual characteristic. At puberty, kisspeptin triggers GnRH and LH, the testes make testosterone, and testosterone drives secondary characteristics like a deeper voice, pubic hair and further genital growth.

5. Estrogen, made from testosterone, masculinizes the brain
Huberman repeats it deliberately: masculinization of the brain 'is not accomplished by testosterone.' Neurons containing aromatase convert testosterone into estrogen, and estrogen organizes the masculine circuits. He cites work from Nirao Shah's lab at Stanford showing that estrogen sets up masculine sexual and territorial behavior circuits, while testosterone later controls whether those behaviors are expressed. Estrogen that's too low also suppresses libido in males.

6. Hormones only work if their receptors do
In androgen insensitivity syndrome, a person is XY with internal testes that make testosterone, but the androgen receptor is mutated. They look and generally identify as female, and they often learn their karyotype only when they don't menstruate at puberty. They can't conceive because they have no uterus or ovaries. Huberman uses the condition to show that a hormone level alone tells you little without functioning receptors.

7. Cannabis and alcohol push hormones toward estrogen
Huberman says that all but one of the studies he found show cannabis raises aromatase activity. That's consistent with higher reported rates of gynecomastia in male users, and studies suggest use during pregnancy shifts fetal hormones in an estrogenic direction. Alcohol, especially beer and some grain alcohols, can also increase estrogenic activity, so he flags drinking during puberty as well as during pregnancy.

8. Cell-phone radiation and the gonads: an emerging, uncertain literature
A 2013 study that placed a phone under rat cages found small but significant defects in testicular and ovarian development. Many more studies have appeared since, in journals of mixed quality. One study (Eskander et al., Clinical Biochemistry) linked phone proximity and living near base stations with lower cortisol, thyroid hormones, prolactin and testosterone. Huberman cautions that confounders like nearby highways could explain such findings, and he's not aware of quality evidence that phones harm the brain.

EXAMPLES

1. Guevedoces in the Dominican Republic
Children with a 5-alpha reductase mutation, first described in Science in the 1970s, look female at birth because they can't make DHT. Around age 11–13, testosterone at puberty causes a penis to grow. The children's identities and how their communities treat them vary widely, and some communities recognize a third category.

2. Declining sperm counts and atrazine
Average sperm density fell from 113 million/ml in 1940 to 66 million/ml by 1990 in the US and Western Europe, semen volume dropped about 20%, and normal spermatogenesis fell from 56.4% to 26.9% between 1981 and 1991. Tyrone Hayes at UC Berkeley found testicular abnormalities in 10–92% of male frogs at western and midwestern US sites exposed to the herbicide atrazine. The fungicide vinclozolin, an anti-androgen, prevents penis formation in rats.

3. Finger-length ratios
Huberman was a co-author on Marc Breedlove's 2000 Nature paper, which he says has been replicated six times. Greater prenatal androgen exposure is associated with a ring finger (D4) longer than the index finger (D2). On average, this pattern is more pronounced in males than in females, and also in women who self-report as lesbian. Gay men show a typical or 'hypermasculinized' male ratio. The ratio has to be measured properly from the base crease, and it describes averages, not individuals.

4. Spotted hyenas and androstenedione

In Steve Glickman's Berkeley colony, dominant female hyenas had clitorises larger than males' penises, driven by high androstenedione, a precursor to testosterone. They give birth through it, and many cubs die. Androstenedione was once sold over the counter and was linked, though Huberman says it was never verified, to baseball doping scandals.

5. Older-brother effect

The probability that a male will self-report as homosexual rises statistically with each older brother. One emerging idea is that the mother keeps a biological 'record' of male fetuses, through DHT and other signals acting epigenetically or on the placenta, that influences later pregnancies.

OTHER RELEVANT

1. Mind skin contact with hormone-active products

Huberman describes cases of boys developing breast buds after skin contact with family members using evening primrose oil, which he says has estrogenic compounds. People on testosterone cream should avoid skin contact with children and anyone trying to stay more estrogenic. He says the evidence on soy isoflavones is decent but weaker than for some of these other factors.

2. Creatine and hair

Huberman says studies show creatine increases 5-alpha reductase activity, and therefore DHT. That could explain the anecdotal hair loss some users report, while others notice nothing. Hair-loss drugs work by blocking this conversion, which is also why they can cause side effects linked to low DHT.

3. Keep your phone away from your groin

Given how uncertain the evidence is, Huberman's own choice is modest: he doesn't keep a switched-on phone in his pocket, and he isn't giving up his phone. He frames this as precaution, not proven harm.

How Foods and Nutrients Control Our Moods

Date: 2021-03-15 · Duration: 1:44:07
URL: https://www.youtube.com/watch?v=XfURDjegrAw

KEYPOINTS

1. The vagus nerve is a two-way highway, not a 'calm-down' button
Huberman describes the vagus (cranial nerve X) as carrying sensory information from the stomach, intestines, heart, lungs and immune system up to the brain, plus motor commands back down. He calls generic 'vagus stimulation' a terrible concept: the same nerve signals infection and helps trigger fever, so you want to engage specific pathways rather than the whole nerve.

2. Polyvagal theory got the branching right but is often stretched too far
He credits Stephen Porges for stressing that the vagus has many branches, but says the dorsal/ventral split does not fully match modern anatomy. His bigger complaint is popular use: diagnosing personality, freeze states or joint hypermobility from 'dorsal vagal tone' goes beyond any known physiology.

3. Gut neurons detect sugar without any taste and drive craving via dopamine
Cells in the stomach sense sugar and signal up the vagus to trigger dopamine release. In experiments where people's mouths were numbed and they were blindfolded, they still craved the food that contained sugar. That is why he sees hidden sugars as a problem for the dopamine system, not only for blood glucose.

4. A little anxiety before eating is built into the circuitry
As you approach food, the locus coeruleus releases noradrenaline, which acts on the lateral hypothalamus to inhibit feeding. Calming and fullness signals are meant to take over as you eat. He thinks this explains why some people feel stressed at mealtimes, and he suggests using how well you digest as a guide rather than strict rules about never eating while stressed.

5. People tend to eat until the brain registers enough amino acids, not until the stomach is full
Gut sensors track both how much protein you have eaten and which amino acids it contains. Amino acids matter beyond building muscle because they are the raw material for neuromodulators. L-tyrosine (found in meats, nuts and some plant foods) is the precursor for L-DOPA and dopamine, although the dopamine neurons that drive motivation live in the brain, not the gut.

6. Dopamine is about wanting, and reward prediction error shapes whether you go back for more
Expecting something releases dopamine, and so does getting it. If the actual experience doesn't at least match the build-up, you get less dopamine and are less likely to pursue it again. He uses his own 'affliction' for croissants: hyped croissants tend to disappoint, while one tried at random can satisfy more.

7. Most mood-relevant serotonin is made in the brain, even though the gut makes plenty
He pushes back on the popular claim that '90% of serotonin is in the gut, so mood lives in the gut'. Mood and satiety serotonin come mainly from the raphe nucleus. SSRIs such as Prozac, Zoloft and Paxil help many people, he says, but can blunt emotions, appetite and libido.

8. Changing the omega-3 to omega-6 ratio can affect depression
In a rodent learned-helplessness swim test, raising omega-3s relative to omega-6s made the animals keep swimming longer. In a human study of 60 people with major depression, 1,000 mg/day of EPA worked as well as 20 mg of fluoxetine over 8 weeks, and the combination worked better than either. He says PubMed now holds many studies pointing the same way.

9. EPA may work partly through inflammation and heart rate variability
He cites a 2009 study in which a high omega-6 to omega-3 ratio went along with raised IL-6 and TNF-alpha and poor response to antidepressants. Raising EPA lowered those markers, let low-dose antidepressants work and increased heart rate variability, which he links to the vagal sensing of the heart.

10. Gut microbes support mood, but more probiotics is not better
A healthy microbiome supports mood, digestion and immunity. He cites studies, which he calls somewhat controversial, linking very high probiotic intake (e.g. lactobacillus) to brain fog. Citing published work from Justin Sonnenburg's lab, he favors fermented foods such as sauerkraut, kimchi, pickles and natto, at around two servings a day.

11. Belief changes how the body responds to food
Alia Crum's work shows that what people believe about a food or activity changes measurable physiology, beyond a simple placebo effect. He stresses that this only works when people don't already know the expected outcome. You cannot talk yourself into a poison being healthy or into twelve croissants causing weight loss.

EXAMPLES

1. Milkshake study: same shake, different ghrelin response
Two groups drank an identical milkshake, but one was told it was a low-calorie 'healthy' shake and the other a decadent, high-calorie one. The 'indulgent' group showed a much larger drop in the hunger hormone ghrelin, showing that beliefs about food reach hormones released in the body.

2. Hotel housekeepers told their work was exercise
In another Crum study, hotel workers who were told their daily cleaning was good for their health had lower blood pressure, lost significant body fat and enjoyed their work more 8 weeks later, compared with a group that got a different message. Their actual work stayed the same.

3. Saccharin and the gut microbiome

A Nature study showed saccharin shifted the microbiome toward bacteria linked to inflammation, and antibiotics blocked the effect. Huberman stresses that saccharin shifts the microbiome rather than killing it. He says the negative findings, as far as he knows, were specific to saccharin. Stevia and monk fruit are chemically distinct, though they still need testing.

4. Acetyl-L-carnitine trials

L-carnitine (richest in beef) is converted to acetyl-L-carnitine, which crosses the blood-brain barrier. Studies collected on Examine.com report reduced depressive symptoms, better sperm motility, benefits in PCOS, and reductions in some autism and fibromyalgia symptoms. In a migraine RCT of 133 people, 500 mg for 12 weeks cut monthly attacks, although he notes the control condition was weak.

5. Mucuna pruriens, the 'dopamine bean'

This velvet bean is itchy because of serotonin on its surface and contains L-DOPA inside. Reported effects include better sperm quality, eased Parkinson's symptoms, greater well-being, higher testosterone and lower prolactin. He describes these as a window into what an acute dopamine increase does, not as a recommendation.

OTHER RELEVANT

1. Time macronutrients to your mental state

Huberman's own pattern: fast and exercise early, eat a high-protein, moderate-fat, low-carb lunch to support dopamine and alertness, then eat starchy carbs and tryptophan-rich foods in the evening to raise serotonin before sleep.

2. Be cautious with tyrosine and 5-HTP

He takes L-tyrosine occasionally. He warns it can cause a crash and brain fog the next day, that chronic use may disrupt dopamine pathways, and that people prone to mania should avoid it. 5-HTP knocks him out but wakes him 2–3 hours later, because natural serotonin release peaks late at night. It may also suppress appetite and raise cortisol. Check with a doctor first.

3. Aim for about 1,000 mg EPA per day from a clean source

Sources include fish oil, krill (which gave him itchy skin), chia, flax and grass-fed meat. Pick decontaminated brands and bite a capsule to check it isn't rancid. People with bleeding disorders such as factor V Leiden, or women on birth control, should ask their doctor first. In his words, 'better living through chemistry still requires better living'.

4. Find the diet that suits your microbiome

Keto, vegan and meat-heavy diets each shift the microbiome, and some people feel better while others feel worse. Highly processed foods, animal or plant, drive overeating, as a Cell Press paper showed. Fasting for a day or more depletes gut microbes, which may explain why the first meal back can feel rough, so return to eating gradually.

Control Pain & Heal Faster with Your Brain

Date: 2021-03-01 · Duration: 1:37:58
URL: https://www.youtube.com/watch?v=mcPSRWUYCv0

KEYPOINTS

1. Pain and tissue damage can be completely separated
Neuroscientists prefer the term 'nociception' because pain is subjective. Radiation and excessive X-rays can damage tissue with no sensation at all, while a man in a British medical case report was in agony after a 14-inch nail went through his boot, only for doctors to find it had passed between his toes without breaking the skin. Seeing the nail produced a specific, nail-like pain.

2. Receptor density shapes both sensitivity and healing
Areas packed with receptors, such as the fingertips and lips, have more 'pixels' in the brain's body map, the homunculus. They also have more blood vessels and glia to drive inflammation. As a rule of thumb, large, low-sensitivity areas hurt less when injured but tend to heal more slowly because fewer cells are nearby to mount repair.

3. Some pain is necessary, and acute inflammation is good
People born with mutations that prevent them from sensing pain never trigger the inflammatory response, and their joints literally disintegrate. Huberman's main message is that acute inflammation is the tissue-repair response that calls in cells to clear an injury. Only chronic, out-of-control inflammation is the problem.

4. The brain can relieve pain from the top down
Phantom limb pain arises because the brain's map of the missing limb is intact but has no proprioceptive feedback, so it ramps up activity. V.S. Ramachandran's mirror box let amputees 'see' the missing limb move into a comfortable position, giving immediate relief and remapping. The brain adapts to whatever input it receives, as cochlear implants also show.

5. Use the injured side and restrict the healthy one
Much of the atrophy after a cast comes from inactive nerves rather than unused muscle. About a dozen papers from Timothy Schallert's lab (with Theresa Jones and others) in the 1990s–2000s showed that after one-sided brain or limb damage, restricting the healthy limb forces use of the injured one. This produced plasticity on both sides of the brain via the corpus callosum and faster recovery, provided the injured side is used without pain or further harm.

6. For brain injury, avoid a second hit and support the glymphatic system
Concussion and TBI symptoms include headaches, light sensitivity, poor sleep, poor concentration and mood changes. The agreed priority is to avoid another TBI. The glymphatic system, the brain's 'sewage' clearance, works mostly during slow-wave sleep early in the night. Sleeping on your side, or with the feet slightly elevated, appears to increase clearance (limited but solid data); Huberman puts a thin pillow under his ankles.

7. Zone 2 cardio supports brain clearance
A review he cites found that conversational-pace cardio for 30–45 minutes three times a week improved clearance of debris after injury and glymphatic flow generally. Clear it with your physician if you are injured. He contrasts this with the popular focus on high-intensity intervals.

8. Belief, adrenaline and love all blunt pain
Punches barely hurt during a fight because adrenaline and noradrenaline shut down pain pathways; it hurts afterwards. People expecting morphine report relief before receiving it. Sean Mackey's Stanford imaging study found that looking at a romantic partner's photo raised heat-pain thresholds, and the effect was stronger the newer and more obsessive the love. Huberman thinks dopamine is the likely driver, though it hasn't been measured.

9. Acupuncture effects depend on where and how hard you stimulate
Qiufu Ma's lab at Harvard found that weak stimulation of the abdomen did nothing, while intense electroacupuncture there was pro-inflammatory via a splenic sympathetic pathway. Low-intensity stimulation of the hind limbs activated the vagus nerve and lowered inflammatory markers such as IL-6. So acupuncture can't simply be called good or bad; it maps onto real body–autonomic wiring.

EXAMPLES

1. Kelly Starrett's injury basics
Developed with Starrett of The Ready State: at least 8 hours in bed per night, even if not all asleep, with NSDR if you can't sleep; at least a 10-minute walk a day if it doesn't aggravate the injury; and heat rather than ice. Restricting blood flow above and below an injury and then releasing it may also boost perfusion.

2. Why ice may backfire
The exercise physiologists and physicians Huberman spoke to described ice as largely numbing or placebo. It may 'sludge' blood, lymph and fascial interfaces and slow macrophages carrying debris away. Heat seems to help by improving tissue viscosity and fluid clearance rather than through heat-shock proteins. Huberman notes this may be contested.

3. Wim Hof / Tummo breathing and endotoxin
A PNAS paper showed that this adrenaline-releasing breathing helped counter endotoxin. Stress liberates killer cells, so acute stress fights infection. People often get sick once a prolonged stressor, such as the Texas cold snap, ends and the immune response drops.

4. Young blood
Tony Wyss-Coray's Stanford lab reported in 2014 that young rodent blood restored memory and vitality in old rodents. Umbilical cord blood did the same, and one candidate factor is TIMP2. Huberman offers no protocol from this.

OTHER RELEVANT

1. Think twice about turmeric and early anti-inflammatories

Turmeric is anti-inflammatory, but Huberman is skeptical: a Stanford-linked study found much of it contaminated with lead, and it can antagonize DHT, with some men reporting blunted libido and mood. NSAIDs that block prostaglandins may be useful for function and pain but may work against the early inflammation you want.

2. Be cautious with PRP and stem cell offers

PRP has never been properly tested against injection alone, and its stem cell content is 'infinitesimally small'. A Florida clinic was shut down after patients went blind from stem cell injections into the eye, and uncontrolled stem cells can form tumours. Hold off on stem cell treatments for now.

3. For whole-body pain, consider light and sunlight

Fibromyalgia involves too little central inhibition of pain. Local red light may help, but experts Huberman spoke to see systemic red light as 'approximating nature', so sunlight may do as much or more. The strong red-light data he knows of come from Glen Jeffery's macular degeneration work in people over 40.

4. Combine movement, heat, light and sleep

Huberman's synthesis for recovery: protect the injury, keep gently moving (movement itself has an analgesic effect), use heat, get light, and prioritize sleep. Consult your physician before adding or dropping any protocol.

Understand and Use Dreams to Learn and Forget

Date: 2021-02-01 · Duration: 1:17:49
URL: https://www.youtube.com/watch?v=FFwA0QFmpQ4

KEYPOINTS

1. Sleep runs in ~90-minute ultradian cycles whose makeup shifts across the night

Early cycles are dominated by shallow and slow-wave (non-REM) sleep with little REM; each later cycle contains progressively more REM. Huberman stresses this holds even if sleep is broken by a bathroom trip: the more total sleep you get, the more REM you accumulate toward morning. The two stages handle different kinds of learning, which is the backbone of the whole episode.

2. Slow-wave sleep has a distinct chemical signature: near-zero acetylcholine, some norepinephrine, lots of serotonin

Acetylcholine, normally the focus neuromodulator (from brainstem and nucleus basalis sources), plummets almost to zero, so the brain shows big sweeping waves rather than focused activity. A little norepinephrine remains, linked to movement circuitry, and serotonin is high. You are not paralyzed in this stage, which is why sleepwalking typically happens here.

3. Motor-skill learning and learning of fine details consolidate mainly in early-night slow-wave sleep

Studies that selectively deprived people of slow-wave sleep, by waking them when EEG showed it or by chemically biasing sleep away from it, found poor motor learning and poor performance on tests of detailed rules, such as spelling of difficult words. Because this stage is front-loaded, even a short night still captures much of it.

4. REM sleep removes serotonin and, crucially, epinephrine, while the body is paralyzed and the mind hallucinates

REM, discovered in the 1950s in a Chicago sleep lab, involves erratic eye movements driven by pons-thalamus-cortex waves, atonia (full paralysis) and vivid hallucinatory dreams. Norepinephrine/epinephrine, the chemical signature of fear and anxiety, is essentially absent, one of the few times in life it sits near zero. That lets you replay emotionally loaded events without the fear response.

5. REM acts as nightly self-therapy by uncoupling emotion from experience

Huberman frames REM as where emotional load is attached to the right experiences and stripped from the wrong ones. It also eliminates irrelevant 'meanings', the links between experiences. Too much connectivity resembles a child melting down because the ice cream shop is closed; adult emotional stability largely comes from pruning connections, and REM continues that work.

6. Losing REM makes people irritable and prone to catastrophizing

Selective REM-deprivation studies show emotionality gets 'unhinged': small things feel big and the future looks daunting. Huberman's own pattern is to fall asleep at 10:30–11 pm, wake at 3–4 am, then use non-sleep deep rest (NSDR) to fall back asleep until about 7 am to capture REM. On mornings he can't go back to sleep, he notices the irritability.

7. Strong nightmares likely occur in slow-wave sleep, not REM

Since epinephrine is absent in REM, intense fear there is unlikely, so frightening being-chased dreams probably arise in slow-wave sleep, though he allows for exceptions. Waking in a panic is better explained as REM content spilling into waking just as adrenaline becomes available again. He flags this research as not fully settled.

8. REM atonia can intrude into waking life as sleep paralysis

Some people wake fully conscious but unable to move, sometimes while hallucinating; it usually breaks within seconds but can feel far longer because dreams distort time. Huberman notes a theory that many 'alien abduction' reports (paralysis, faces, floating) map closely onto this sleep-into-waking intrusion.

9. EMDR and ketamine therapy share core features with REM

EMDR (lateral eye movements while recounting trauma) suppresses the amygdala. Ketamine, a dissociative anesthetic related to PCP, blocks the NMDA receptor, which gates long-term potentiation after intense experiences, so emotion cannot be wired onto the memory. REM achieves something similar chemically by withholding epinephrine. All three reduce the emotional charge of a memory rather than erasing it.

10. Sleep consistency may matter as much as, or more than, total sleep for learning

A study by Harvard undergraduate Emily Hoagland in Robert Stickgold's lab found exam-style learning tracked night-to-night regularity more than total duration: 6, 6, 5, 6 hours beat 6, 10, 7, 4. As Huberman recalls it, each hour of variation was tied to roughly a 17% performance drop. He finds this a relief, since a steady 6–6.5 hours may beat chasing 8–9 erratically.

EXAMPLES

1. Francine Shapiro's walk behind Stanford

The Palo Alto psychologist noticed a troubling memory felt less intense while walking, then brought only the side-to-side eye movements into the clinic: 30–60 seconds of eye movements, then recounting the event. EMDR is one of the few behavioral trauma treatments approved by the American Psychological Association; it works best for single-event trauma like a car crash rather than an entire childhood or divorce, and should be done with a certified clinician.

2. Why lateral eye movements work

Huberman initially thought EMDR was 'crazy'. He rejects the explanations that it mimics REM eye movements or synchronizes brain hemispheres. Instead, at least five high-quality papers in roughly five years, in journals like Neuron and Nature, show horizontal (not vertical) eye movements suppress the amygdala. Those are the eye movements generated naturally when you walk, run or cycle forward.

3. The chicken soup and explosion thought experiment

If an explosion went off while he ate soup at his kitchen table, NMDA-gated plasticity would couple the table and soup to fear, raising heart rate and sweating at every later meal. Some emergency rooms stock ketamine to infuse soon after trauma so the emotion still occurs but isn't wired in. He flags the ethics and warns recreational ketamine is dangerous and can be lethal.

4. Matt Wilson's spatial replay findings

Work initiated at MIT showed neurons that fired while rodents navigated a space replay the same firing pattern during REM; similar replay appears in non-human primates and humans. Huberman links it to solidifying important new places, like a city, a building or social interactions, over the following days.

5. Sarah McKay on menopause

His colleague in Australia, who studies menopause and the brain, says many emotional effects of menopause aren't directly hormonal. Temperature-regulation changes disrupt sleep, which in turn impairs the circuits that regulate emotion.

OTHER RELEVANT

1. Don't panic before a performance after a short night

Slow-wave sleep and physical recovery are front-loaded, so if you have already trained the skill, waking after 3–4 hours before a competition shouldn't wreck performance. A full night remains better.

2. Levers that shift sleep architecture

Resistance exercise (not aerobic) increases the proportion of slow-wave sleep, apparently without disrupting other stages, though it need not be close to bedtime. Tryptophan or 5-HTP gave Huberman deep sleep and then an early wake-up; he says serotonin supplements can disrupt REM/slow-wave timing. A few studies suggest arginine may raise slow-wave sleep, but it has cardiac and other effects to check. Alcohol and THC speed sleep onset but disrupt depth and the normal stage sequence.

3. Full bladder: avoid it, unless you want dream recall

A bladder-to-brainstem circuit wakes you; drinking lots of fluid fractures REM, which disrupts sleep but increases dream recall in lab studies. He doesn't recommend it, and also advises against going to bed dehydrated.

4. Tools for lucid dreaming and dream journaling

About 20% of people lucid dream, and some who do it nightly find sleep less restorative. To induce it, look at a cue (e.g., a drawn red apple) before sleep for several days. To reduce it, wake at the end of a 90-minute cycle (6 or 7.5 hours rather than 7). For journaling, note sleep and wake times and any recall; dreams centered on others' intentions (theory of mind) are more likely REM dreams.

How Your Brain Works & Changes

Date: 2021-01-04 · Duration: 1:02:31
URL: https://www.youtube.com/watch?v=H-XfCl-HpRM

KEYPOINTS

1. Think 'nervous system,' not just 'brain'
Huberman describes the brain, spinal cord and the two-way connections to every organ as one continuous loop, like a Möbius strip with no clear start or end. The nervous system governs other systems and is shaped by them. For example, it signals the spleen to release killer cells during infection, and the 'ache' in a stomach ache is a nervous-system event.

2. Experience is electrical patterns across neurons and synapses
Ramón y Cajal and Camillo Golgi's staining work around 1900 showed the nervous system is made of separate nerve cells separated by gaps (synapses), not one giant cell. Neurons release chemicals into synapses, and the next cell converts them into electrical signals. Huberman compares memories to songs played as patterns of piano keys. The hippocampus doesn't store sentences but patterns of activity, and déjà vu is the same pattern firing again, like a familiar song played on a different instrument.

3. The brain is a map of experience, with cells this specific
An early-2000s paper in Nature found a single neuron in a healthy person that fired only when they viewed Jennifer Aniston. If you can recognize her face, Huberman says, you have 'Jennifer Aniston neurons.' He uses this to show that we come into the world biased to learn certain things, and experience then fills in the map.

4. Sensation is fixed, but perception is steered by attention
Huberman lists five or six things the nervous system does: sensation, perception, emotions, thoughts, actions and plasticity. Sensory receptors set non-negotiable limits. Other animals detect what we can't, such as heat emissions or magnetic fields used for long-distance migration, and he urges skepticism toward people claiming robust human magnetic sensing. Perception is whichever sensations you attend to. Your feet were touching the floor all along, but you notice it only when you direct attention there.

5. You have two attentional spotlights, so a form of multitasking is real
Primates, including humans, are capable of covert attention. You can place one spotlight on what you're reading or listening to and a second on how your food tastes or where your child is. Huberman pushes back on the blanket claim that multitasking is impossible.

6. Neuromodulators bias whole circuits, which is why antidepressants have side effects
Dopamine, serotonin, acetylcholine and epinephrine make some circuits more likely to be active and others less. Huberman frames serotonin as feeling good about what you already have, and dopamine as less about reward and more about motivation toward things out in the world. Drugs developed from the 1950s–70s altered several systems at once. Serotonin-raising antidepressants can lift mood but, at too high a dose or for the wrong person, can dull motivation, appetite or libido because serotonin acts on receptors in those circuits too.

7. Deliberate action means top-down control over reflex, and it feels like strain
Walking runs on brainstem central pattern generators. Hiking over rocks requires forebrain top-down control. Huberman calls deliberate mode 'DPO,' for analyzing Duration, Path and Outcome. Suppressing a reflexive response releases norepinephrine (adrenaline), which feels like agitation. Children lack the forebrain circuitry for full top-down control until around 22–25, which is why they rock, fidget and grab candy, and frontal-lobe damage can produce blurting and impulsivity.

8. Neuroplasticity is a two-phase process: focused effort, then rest
Until about age 25 the brain changes fairly passively. After that, change has to be self-directed. In waking, epinephrine from the brainstem creates alertness, and acetylcholine acts as a 'highlighter' that marks which neurons were active (dopamine and serotonin also gate plasticity). The actual rewiring happens later, during sleep and non-sleep deep rest. Agitation and strain while learning are signs the process has been triggered, not that it's failing.

9. Your days, as well as your nights, run in ~90-minute ultradian cycles
Sleep cycles through stages one to four in roughly 90-minute blocks, and similar cycles continue while you're awake, governing how well you can focus. The autonomic nervous system acts as a seesaw between alertness and calm, and it governs both these cycles and the daily wake–sleep arc. To direct plasticity, you need to master both transitions, waking up and falling asleep. Huberman says sleep timing gets too little discussion and that fragmented schedules like the 'Uberman' are unlikely to match a solid block of sleep.

EXAMPLES

1. World War I bullet wounds mapped the brain
Changes in ammunition meant bullets made small, discrete entry and exit holes, and better wound cleaning meant more soldiers survived. Neurologists collected patients with specific deficits. Some could see a face but not tell whose it was, and others spoke gibberish yet understood language perfectly. This showed that speech production and comprehension rely on separate regions.

2. Blind braille readers
People born blind use the brain area normally devoted to vision for reading braille, which Huberman cites as an extreme example of experience-driven plasticity.

3. 20 minutes of deep rest after hard learning
A study Huberman cites (not from his lab) found that taking about 20 minutes immediately after an intense learning bout to

deliberately switch off focused thinking accelerated plasticity.

4. A tone during deep sleep boosts learning

In another study, people learned a language or motor skill while a tone played periodically. Replaying that tone during deep sleep, without any need for dreaming, led to faster learning and better retention. The tone works like a Pavlovian reminder to the sleeping brain about what mattered that day.

OTHER RELEVANT

1. Embrace the strain when learning

If learning a skill or holding back a reaction feels agitating, that's epinephrine and the attention it creates, which is the gateway to change. Push through focused bouts instead of reading the discomfort as failure.

2. Follow focus with deliberate rest

After a hard learning session, take a period of non-sleep deep rest where your mind can drift, and protect your sleep. That's when the changes are consolidated.

3. Work with 90-minute blocks and notice your best time of day

Plan your deepest learning inside roughly 90-minute cycles, and note whether you learn better early in the day or later. Some people are strong morning learners and weak in the afternoon. Experiment with yourself, and run new tools past a healthcare professional.