Cold, Heat, Breath & Body Tools

Huberman Lab Keypoints

Episodes in this pack: 7

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.

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.

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.

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.

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.

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.

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.