# Hormones, Sex & Fertility

Huberman Lab Keypoints

Episodes in this pack: 10

# 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.

# 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.

# 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 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.

# 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.

# 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.

# 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.

# 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.

# 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.

# 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.