PPW — PEAK PERFORMANCE WELLNESS · MALE VITALITY PROTOCOL

THE PEAK T PROTOCOL

A science-backed system for reclaiming testosterone, protecting fertility, and optimising male biology in a world designed to destroy it.

59%

Decline in avg testosterone since 1970

50%

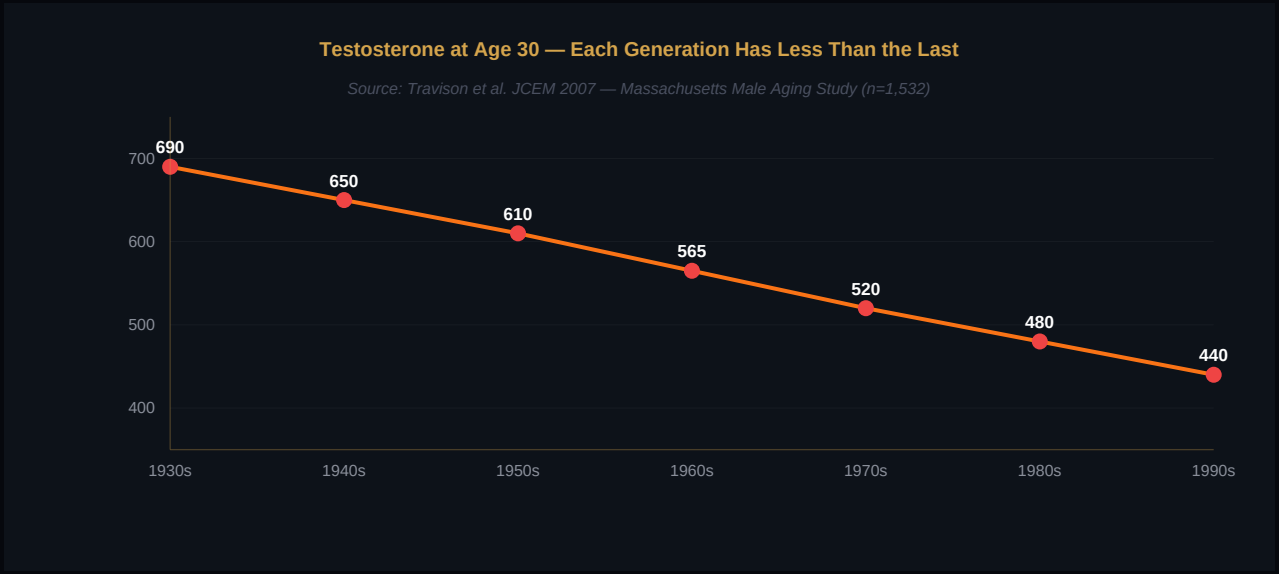
Drop in sperm count across Western nations

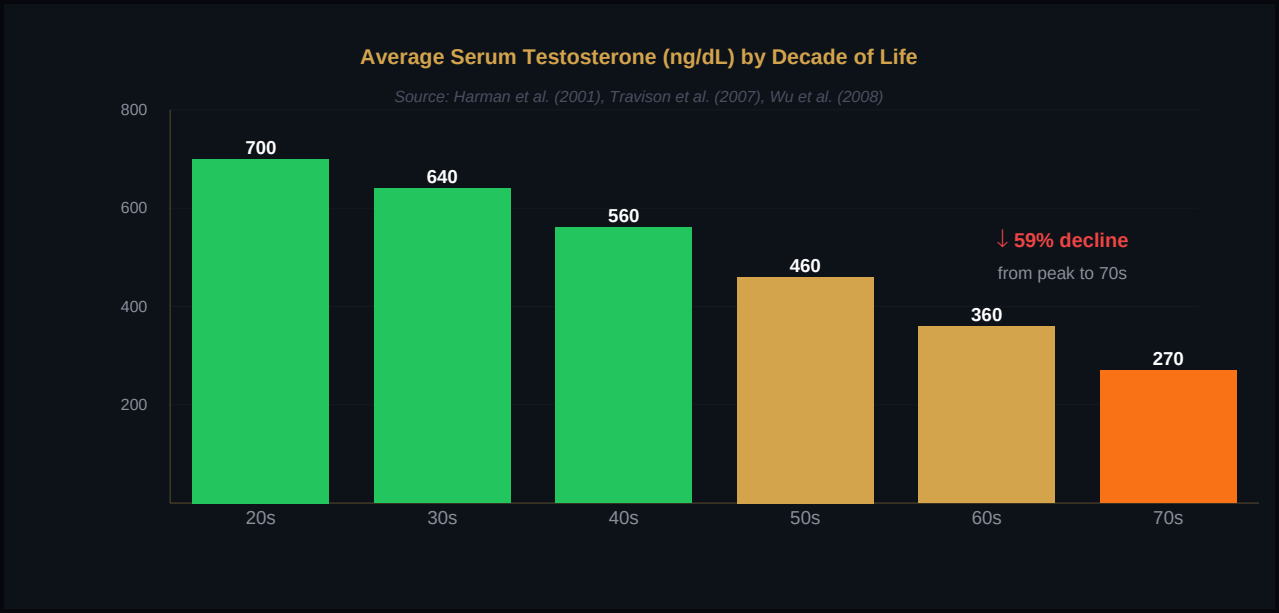
45

Youngest age studied for successful fatherhood

Testosterone is collapsing. This is not a coincidence.

The data is unambiguous, the timeline is rapid, and the cause is not ageing alone. A 30-year-old man today has measurably lower testosterone than his father did at 30, and his grandfather before that. This is a population-level hormonal collapse driven by environmental, dietary, and lifestyle factors that have all worsened simultaneously over the past 50 years.





Travison et al. Journal of Clinical Endocrinology & Metabolism, 2007

Analysis of 1,532 men in the Massachusetts Male Aging Study found a population-level decline of approximately 1.2% per year — independent of age. A man aged 60 in 2004 had testosterone levels 15% lower than a 60-year-old man measured in 1987. This cannot be explained by ageing alone.

■ Levine et al. Human Reproduction Update, 2017 — Meta-analysis of 185 studies (n=42,935)

Sperm count declined 52.4% among men in Western countries between 1973 and 2011. The rate of decline showed no sign of levelling off. This is one of the largest meta-analyses ever conducted on male reproductive health.

■ Perheentupa et al. European Journal of Endocrinology, 2012

Finnish study showed that serum testosterone fell by 33% in men born in 1962 vs men born in 1927 — measured at the same biological age. Diet and environmental exposure were identified as primary drivers.

■ Simply Put:

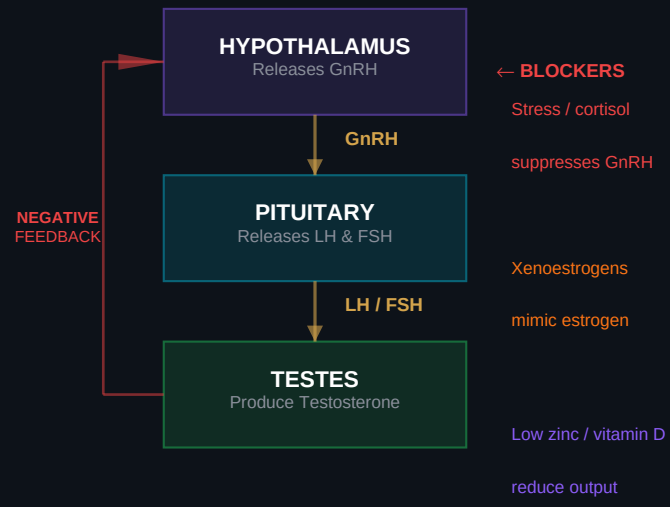
Imagine your testosterone is like the signal on a phone. A generation ago, men had full bars everywhere. Today, most men are walking around at 2 bars — and they think it's normal because everyone around them has the same weak signal. It isn't normal. The phone hasn't changed — the towers have been quietly switched off.

1.2%	52%	1970
annual decline per year since 1970 (Travison 2007)	drop in sperm count over 40 years (Levine 2017)	when the collapse began — same year as seed oils going mass-market

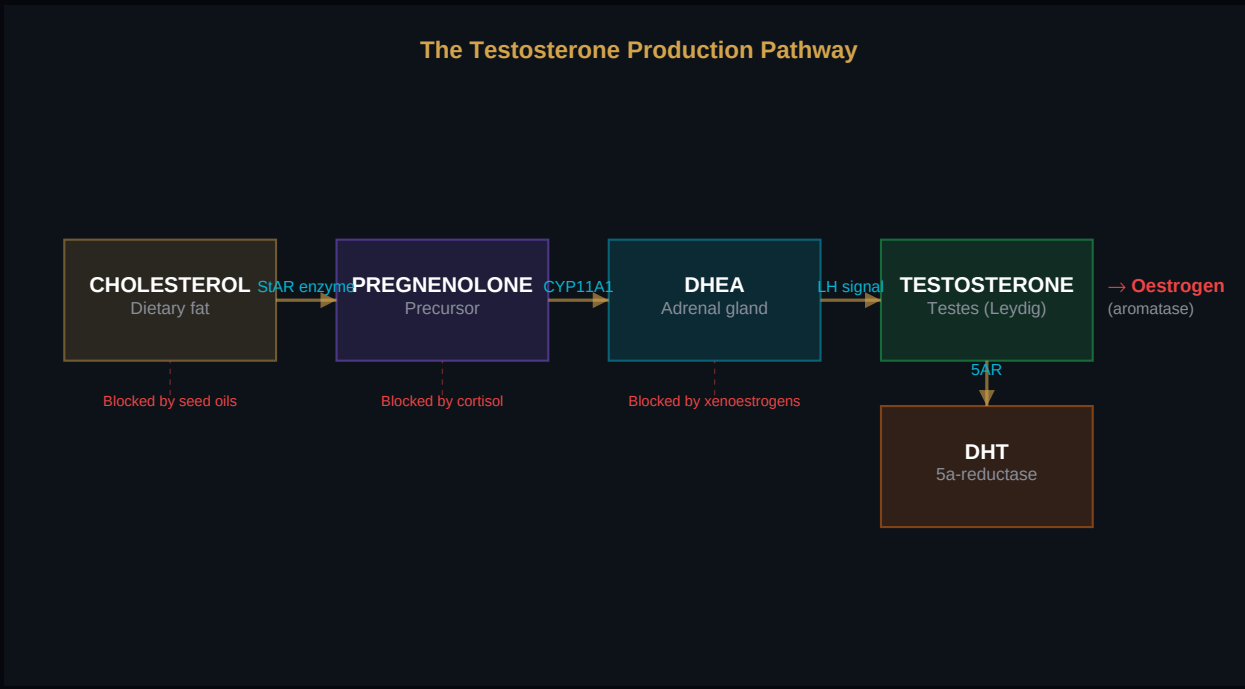
The factory. The raw materials. The things that shut it down.

Testosterone is not simply "produced" by the testes. It is the end product of a sophisticated multi-organ signalling cascade that begins in the brain and requires specific raw materials, enzymatic processes, and hormonal signals at every step. Disrupting any single step reduces output. Modern life disrupts most of them simultaneously.

The HPTA Axis — How Your Brain Controls Testosterone



When any part of this axis is disrupted, testosterone output drops — even if the testes are healthy



■ Simply Put:

Think of testosterone production like a factory with three bosses. The top boss (hypothalamus) sends an order down to the middle boss (pituitary), who sends workers (LH hormones) to the factory floor (testes) to actually make the testosterone. If ANY boss gets stressed, confused, or blocked — the factory slows down or stops. Most of the enemies in this guide work by confusing one of these three bosses.

The Role of Cholesterol

Testosterone is a steroid hormone — meaning it is synthesised directly from cholesterol. Every molecule of testosterone your body makes starts as cholesterol. This is why very low-fat diets, statins (cholesterol-lowering drugs), and seed-oil-heavy diets that displace saturated fat are all associated with reduced testosterone. You need dietary fat — specifically saturated and monounsaturated fat — to have the raw material for hormone production.

■ Hamalainen et al. Hormone and Metabolic Research, 1984

Men placed on a low-fat diet for 6 weeks showed a 15% reduction in serum testosterone. When fat intake was restored, testosterone returned to baseline. Dietary fat composition directly determines steroid hormone availability.

■ Rui Wang et al. Journal of Steroid Biochemistry, 2005

Polyunsaturated fatty acids (particularly linoleic acid from seed oils) directly inhibit the StAR protein — the critical enzyme that transports cholesterol into the mitochondria for testosterone synthesis. This is the mechanistic link between seed oil consumption and reduced testosterone.

The Aromatase Problem

Testosterone can be converted to oestrogen by the enzyme aromatase, found in fat tissue, liver, and brain. Higher body fat = more aromatase = more testosterone converted to oestrogen. This creates a vicious cycle:

low testosterone → fat gain → more aromatase → lower testosterone. Many of the dietary and lifestyle interventions in this protocol work specifically by reducing aromatase activity.

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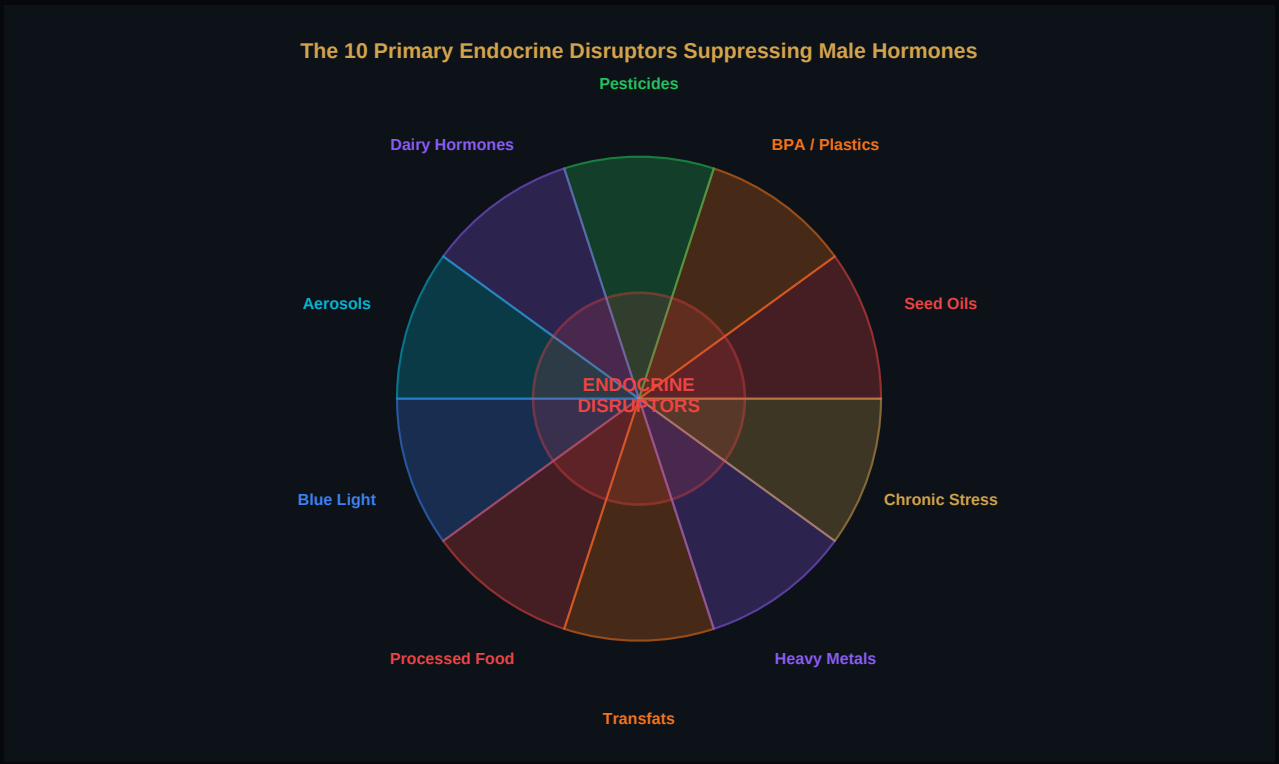
12 forces designed by modern life to destroy your hormones.

None of these are new discoveries. The research exists. The problem is that these factors have converged simultaneously — each one compounding the others — creating a hormonal suppression environment that no single generation has ever faced before.



01 — SEED OILS & FAT RATIO

Sunflower oil, canola, soybean, corn oil, margarine, and vegetable spreads are polyunsaturated fatty acids (PUFAs) that are chemically unstable. When heated, they oxidise into aldehydes, trans-fats, and toxic breakdown products including 4-hydroxynonenal (4-HNE) and acrolein — documented testicular toxins.

— **Linoleic acid (omega-6)** the dominant fatty acid in seed oils, directly inhibits the StAR enzyme required to begin testosterone synthesis inside the mitochondria.

— **Oxidised LDL from seed oils** damages Leydig cells — the specific cells in the testes that produce testosterone.

— **Disrupts omega 3:6 ratio** the ancestral diet had a 1:2-4 omega-3 to omega-6 ratio. The modern seed-oil-heavy diet sits at 1:20. This imbalance drives chronic systemic inflammation that suppresses the HPTA axis.

— **Trans-fats** formed during the deodorisation of seed oils — reduce testosterone by disrupting cell membrane integrity in Leydig cells.

■ **Key Research:**

Rui Wang et al. (2005) J Steroid Biochem Mol Biol; Haeri et al. (2020) IJFS; Safarinejad et al. (2010) Journal of Andrology

■ **Simply Put:**

Think of seed oils like pouring the wrong type of petrol into your body's hormone engine. The engine can run for a while, but it's slowly getting damaged from the inside — gumming up the exact machinery that makes testosterone. Butter and coconut oil are the right fuel. Seed oils are the wrong fuel. It's that simple.

Action: Switch to: butter, ghee, tallow, coconut oil, extra virgin olive oil (cold, not heated). Read every label — seed oils are in almost all processed foods, sauces, and restaurant cooking.

02 — XENOESTROGENS & PLASTICS (BPA, BPS, PHTHALATES)

Xenoestrogens are synthetic chemicals that mimic oestrogen in the body. They bind to oestrogen receptors, disrupt the HPTA axis by mimicking negative feedback, and reduce LH secretion — directly reducing testosterone production. BPA from plastic bottles, BPS, phthalates from flexible plastics, and parabens in personal care products are all documented xenoestrogens.

— **BPA (Bisphenol A)** binds oestrogen receptors with 10,000x lower affinity than oestradiol but is present in concentrations 10,000x higher — making the net exposure significant.

— **Plastic + heat** heating plastic (hot drinks in plastic cups, water bottles in sunlight, microwaving in plastic) dramatically accelerates xenoestrogen leaching — by up to 55x compared to room temperature.

— **Phthalates in toothpaste tubes** absorbed through the oral mucosa — one of the most direct exposure routes. Switching to glass jar or metal tube eliminates this exposure.

— **Parabens in skincare and deodorant** absorbed transdermally. Measurably present in male reproductive tissue in autopsy studies.

■ **Key Research:**

Meeker JD et al. (2010) Environmental Health Perspectives; Swan SH et al. (2005) Environmental Health Perspectives; Duty SM et al. (2003) Epidemiology

■ **Simply Put:**

Imagine tiny fake keys (plastic chemicals) that jam the locks (hormone receptors) in your body. When the lock is jammed with a fake key, the real key (testosterone signal) can't get in. Your brain sees the locks are "occupied" and thinks there's enough oestrogen already — so it sends less signal to make testosterone. You lose hormone power without knowing why.

Action: Switch to: glass or stainless steel water bottles, glass food containers, wax-wrap or glass for storage, glass jar or metal-tube toothpaste, natural deodorant, unscented soaps. Never heat food in plastic.

03 — GMO FOODS & PESTICIDES (GLYPHOSATE)

Glyphosate — the active ingredient in Roundup herbicide, used extensively on GMO crops — is an endocrine disruptor with documented effects on testosterone. It chelates zinc and manganese (both critical for testosterone synthesis), disrupts gut bacteria required for hormone metabolism, and has been shown to directly reduce testosterone in animal models at exposure levels comparable to human dietary intake.

— **Zinc chelation** glyphosate binds zinc in the gut, preventing absorption. Zinc is the single most critical mineral for testosterone — it is required for LH receptor function, testosterone synthesis, and inhibiting aromatase.

— **Gut microbiome disruption** glyphosate is a patented antibiotic that selectively kills gut bacteria, disrupting the estrobolome — the bacterial community responsible for oestrogen metabolism. Disrupted estrobolome = oestrogen recirculation = hormonal imbalance.

— **Leydig cell toxicity** glyphosate demonstrated direct toxicity to Leydig cells at concentrations below current safety thresholds in peer-reviewed studies.

■ Key Research:

Clair E et al. (2012) Toxicology; Samsel A, Seneff S (2013) Entropy; de Liz Oliveira Cavalli VL et al. (2013) Toxicology

■ Simply Put:

Pesticides are like tiny wrenches thrown into your hormone machinery. They don't just affect the plants — they get into your body and block the specific tools (like zinc) that your body uses to make testosterone. Organic food doesn't just mean "healthier" — it means keeping the machinery clean.

Action: Prioritise organic for: oats, wheat products (if consuming), strawberries, spinach, grapes, apples, bell peppers (the "dirty dozen"). Grow or buy organic microgreens — they can be grown on a windowsill and are among the most nutrient-dense foods available. A quality organic superfood supplement covers the gaps.

04 — PROCESSED FOODS & ULTRA-PROCESSED INGREDIENTS

Ultra-processed foods (defined as NOVA Class 4 — more than 5 ingredients, containing additives not used in home cooking) are associated with lower testosterone, lower sperm quality, and higher oestrogen levels in multiple population studies. The mechanisms are compound: seed oils, refined sugar (insulin spikes suppress testosterone), synthetic emulsifiers disrupting gut barrier, and caloric displacement of nutrient-dense whole foods.

— **E numbers to avoid** carrageenan (E407), polysorbate 80 (E433), titanium dioxide (E171), carboxymethylcellulose (E466) — all documented gut barrier disruptors that allow endotoxin translocation, driving systemic inflammation that suppresses the HPTA axis.

— **Refined sugar and insulin** a single high-sugar meal reduces testosterone by up to 25% for 2 hours via insulin-mediated suppression of SHBG and direct LH inhibition.

— **Displacement effect** eating processed food means not eating zinc, magnesium, vitamin D, selenium — the four minerals most critical for testosterone production.

■ Key Research:

Chavarro JE et al. (2008) Fertility and Sterility; Haring R et al. (2009) Diabetes Care; Meeker JD (2012) Reviews in Endocrine & Metabolic Disorders

■ Simply Put:

Ultra-processed food is not food — it's a product designed in a laboratory to be addictive, cheap to make, and long-lasting on a shelf. Your body's hormone system evolved to work with real food. When you eat ultra-processed food, your body is trying to run a programme but all the data files are corrupt. Real food is the original programme.

Action: Rule: if it has more than 5 ingredients, or any ingredient you couldn't buy separately in a grocery store — don't eat it. Read every label. The ingredients list, not the nutrition panel.

05 — CONVENTIONAL DAIRY — HORMONES & OESTROGEN LOAD

Modern commercial dairy comes primarily from pregnant cows — whose oestrogen levels are 10-30x higher than non-pregnant cows. Oestrogen is fat-soluble and concentrates in dairy fat. Full-fat conventional dairy can contain measurable quantities of oestrone, oestradiol, progesterone, and IGF-1 that survive pasteurisation. The oestrogen load from conventional dairy significantly exceeds that of soy products across all measured studies.

— **Pregnant cow oestrogen** accounts for 60-70% of total oestrogen intake in Western diets via dairy. The concentration in commercially available full-fat dairy has increased with modern intensive farming.

— **IGF-1 in dairy** insulin-like growth factor-1 in dairy can disrupt androgen signalling and is associated with hormonal disruption in epidemiological studies.

— **A1 casein** triggers an inflammatory response in sensitive individuals, activating the same inflammatory cytokines that suppress testosterone production.

— **Soy comparison** contrary to popular belief, phytoestrogens in soy require conversion by gut bacteria to bioactive forms and are significantly less potent oestrogen-mimics than the actual oestrogens in conventional dairy.

■ Key Research:

Ganmaa D, Sato A (2005) Medical Hypotheses; Malekinejad H, Rezabakhsh A (2015) Cell J; Maruyama K et al. (2010) Paediatrics International

■ Simply Put:

Imagine filling your car with the wrong grade of petrol — and then also adding a chemical that's the opposite of what your engine needs. That's what conventional dairy does to male hormones. The cows are pregnant, and pregnant bodies are full of oestrogen. When you drink that milk or eat that cheese, some of those hormones come with it.

Action: If consuming dairy: choose A2 (goat, sheep, buffalo), raw or minimally processed, from non-pregnant cows where possible. Butter and ghee are lower risk as they are mostly fat with minimal protein. Reduce overall conventional dairy during active protocol.

06 — AEROSOLS, SYNTHETIC FRAGRANCES & HOUSEHOLD CHEMICALS

Aerosol sprays, synthetic air fresheners, conventional cleaning products, and fragranced personal care products contain a class of chemicals called volatile organic compounds (VOCs) and phthalates — many of which are endocrine disruptors. These are absorbed transdermally and inhaled, entering the bloodstream within minutes.

— **Phthalates in fragrance** "fragrance" on an ingredient label is a legal umbrella for up to 3,000 different chemicals — most of which are not disclosed and many of which are phthalates. Phthalates are documented anti-androgens that directly reduce testosterone.

— **Triclosan** found in many antibacterial soaps and some toothpastes — reduces testosterone in animal models and is associated with reduced sperm quality in human studies.

— **Cleaning product VOCs** many conventional cleaning products contain compounds that mimic oestrogen. Switching to vinegar, bicarbonate, and essential oil-based products eliminates this exposure.

■ **Key Research:**

Main KM et al. (2006) Environmental Health Perspectives; Duty SM et al. (2003) Epidemiology; Meeker JD et al. (2010) Environmental Health Perspectives

■ **Simply Put:**

Your skin is not a barrier — it's a sponge. Everything you spray near yourself or put on your skin goes into your bloodstream within minutes. Synthetic fragrances are like smuggling small amounts of chemical oestrogen past your body's security every time you spray them. Natural alternatives have no such smugglers.

Action: Switch to: unscented or essential-oil-based deodorant, fragrance-free washing powder, vinegar + bicarbonate for cleaning, essential oil diffusers instead of air fresheners. Never use aerosol sprays in enclosed spaces.

07 — BLUE LIGHT & SLEEP DISRUPTION

Testosterone production is fundamentally sleep-dependent. The majority of daily testosterone release occurs during sleep — specifically during rapid eye movement (REM) and slow-wave sleep (SWS). Missing deep sleep is biologically equivalent to missing your testosterone production window. Blue light from screens suppresses melatonin production, delays sleep onset, reduces sleep quality, and directly reduces the testosterone surge that should occur during the night.

— **Sleep duration and testosterone** men who slept 5 hours per night showed a 10-15% reduction in testosterone within one week, equivalent to 10-15 years of age-related decline (Leproult & Van Cauter, 2011, JAMA).

— **Melatonin's role** melatonin is not merely a sleep hormone — it directly inhibits aromatase activity in the testes. Less melatonin = more testosterone converted to oestrogen.

— **REM sleep and LH pulse** luteinising hormone (LH) — the signal that tells the testes to produce testosterone — pulses most strongly during sleep. Sleep fragmentation disrupts LH pulsatility.

— **Blue light mechanism** blue wavelength light (480nm) maximally suppresses melanopsin in the retina, which suppresses SCN signalling to the pineal gland, reducing melatonin by up to 85% for 1-3 hours after exposure.

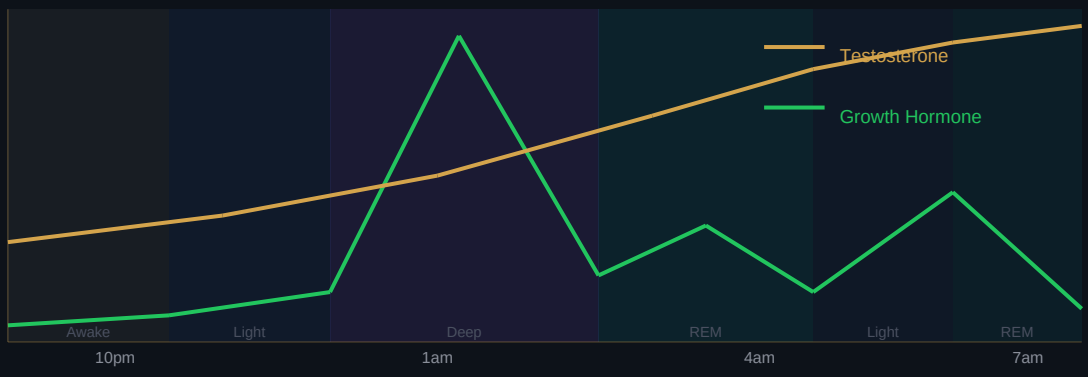
■ Key Research:

Leproult R, Van Cauter E (2011) JAMA; Andersen ML et al. (2011) Neuro Endocrinology Letters; Zhu B et al. (2010) Andrologia

■ Simply Put:

Your body makes most of its testosterone while you sleep — like a night shift at a factory. If you stay on your phone until midnight, it's like flooding the factory floor with bright lights and telling the night workers to go home. No night shift = no testosterone made that night. Every night of bad sleep is a cancelled production run.

Testosterone & Growth Hormone Release During Sleep



Disrupted sleep directly reduces testosterone. Missing deep sleep = missing the testosterone surge.

08 — HORMONES IN CONVENTIONAL MEAT

In many countries (including the United States and several Asian markets), cattle, poultry, and farmed fish are routinely given synthetic growth hormones including oestradiol, progesterone, zeranol, and melengestrol acetate to accelerate growth. These hormones are present in the flesh and fat of the animal and are consumed by anyone eating non-organic, non-pasture-raised meat.

— **Oestradiol implants in cattle** the most commonly used growth hormone in US beef — a synthetic oestrogen 100x more potent than dietary phytoestrogens. Banned in the EU for this reason.

— **Zeranol** a synthetic growth promoter derived from a fungal compound, with documented oestrogenic activity in human breast cancer cell lines.

— **Farmed fish** frequently given synthetic hormones and raised in conditions producing high cortisol (a testosterone antagonist) in the fish tissue.

■ Key Research:

Hartmann S, Steinhart H (1998) J Chrom B; Malekinejad H, Rezabakhsh A (2015) Cell J; EU SCVPH (1999) — Opinion on public health aspects of hormone use

■ Simply Put:

When a cow is given oestrogen to grow faster, that oestrogen gets stored in the fat and muscle. When you eat that beef, you eat some of that oestrogen. Your body can't tell where the oestrogen came from — it just sees more oestrogen signal arriving, and turns down the testosterone production in response.

Action: Choose: organic, grass-fed, pasture-raised meat. Wild-caught fish over farmed. These are worth spending more on — quality over quantity. One grass-fed steak per week is better than five factory-farmed ones.

09 — GUT BACTERIA & THE ESTROBOLOME

The gut microbiome does not just digest food. A specific community of gut bacteria called the estrobolome produces an enzyme (beta-glucuronidase) that determines how much oestrogen is reactivated and recirculated versus safely excreted. A disrupted estrobolome allows oestrogen to recirculate rather than be cleared — raising oestrogen levels and suppressing testosterone. The microbiome also produces short-chain fatty acids that directly regulate testosterone synthesis.

— **Beta-glucuronidase and oestrogen recirculation** dysbiosis increases beta-glucuronidase activity, deconjugating oestrogen in the gut and allowing it to be reabsorbed. This is a documented mechanism of oestrogen dominance in men with poor gut health.

— **Microbiome and zinc absorption** gut bacteria directly influence zinc bioavailability. Dysbiosis reduces the conversion of phytic acid (which binds zinc) and reduces zinc absorption by up to 40%.

— **Akkermansia muciniphila** this specific bacterium maintains the gut mucus layer — its depletion is associated with increased intestinal permeability, LPS translocation, and the resulting systemic inflammation that suppresses testosterone.

— **Leaky gut and testosterone** intestinal permeability allows LPS (bacterial endotoxin) into systemic circulation. LPS directly suppresses LH secretion from the pituitary — reducing the testosterone production signal.

■ Key Research:

Flores R et al. (2012) J Clin Endocrinol Metab; Baker JM et al. (2017) J Steroid Biochem Mol Biol; Clarke G et al. (2014) Molecular Psychiatry

■ Simply Put:

Your gut is like a customs checkpoint for hormones. The right gut bacteria act like good customs officers — they let the right stuff through and stop oestrogen from sneaking back in. Bad gut bacteria are like corrupt officers who let oestrogen back into circulation even when your body tried to throw it away. Result: too much oestrogen, not enough testosterone.

Action: Probiotic supplementation, diverse whole foods, fermented foods (kimchi, sauerkraut), and fibre diversity all directly support a healthy estrobolome. This is why gut health is central to the male hormone protocol.

10 — CHRONIC STRESS & CORTISOL

Cortisol — the primary stress hormone — is a direct testosterone antagonist. Cortisol and testosterone share a precursor (pregnenolone) and compete for it in what researchers call "pregnenolone steal." Under chronic stress, the body prioritises cortisol production (immediate survival) over testosterone (long-term function). This is a brilliantly designed acute stress response that becomes catastrophic when the stress is chronic and never fully resolves.

— **Pregnenolone steal** pregnenolone is converted either to cortisol or to DHEA (testosterone precursor) — not both simultaneously. Chronic stress = chronic cortisol demand = pregnenolone diverted away from testosterone pathway.

— **Cortisol and LH suppression** cortisol directly suppresses GnRH release from the hypothalamus, reducing LH and therefore reducing the signal to the testes to produce testosterone.

— **Cortisol and SHBG** chronic stress increases sex hormone binding globulin (SHBG), which binds free testosterone and renders it inactive. High total testosterone with high SHBG = low free testosterone = low functional testosterone.

— **The modern stress environment** the human stress response evolved for acute, physical threats. It was never designed for 14 hours per day of ambient psychological stress. The hormonal system has not adapted — it treats every notification, deadline, and social anxiety as a predator.

■ Key Research:

Cumming DC et al. (1983) Clin Endocrinol; Viau V, Meaney MJ (1996) J Neuroendocrinol; Aschbacher K et al. (2013) Psychoneuroendocrinology

■ Simply Put:

Cortisol and testosterone are like two people fighting over the same pot of ingredients. When stress is high, cortisol grabs most of the ingredients and testosterone gets the leftovers. Your body does this on purpose — when being chased by something dangerous, making testosterone isn't the priority. The problem is, your body doesn't know the difference between a real threat and an email notification.

Action: Breathwork, meditation, nature time, physical touch, and adequate sleep all reduce chronic cortisol. These are not optional wellness extras — they are mechanistically required interventions for testosterone recovery.

11 — HEAVY LIFTING — THE ESSENTIAL STIMULUS

Resistance training with compound, heavy lifts is the single most powerful lifestyle intervention for increasing testosterone. Testosterone responds to mechanical load as a signal that muscle growth is required. The hormonal response is specific to the type of exercise — and is dramatically different between resistance training and endurance cardio.

— **Compound movements drive the biggest response** squats, deadlifts, hip hinge movements, and heavy pressing involve the most muscle mass and produce the largest acute testosterone spike. Isolation exercises produce minimal hormonal response.

— **Post-workout testosterone window** testosterone peaks 15-30 minutes post-resistance training and remains elevated for 1-2 hours. Training in the late afternoon (4-6pm) aligns with the natural daily testosterone peak for optimal response.

— **Chronic endurance cardio — the opposite effect** marathon running and chronic high-volume endurance training are consistently associated with reduced testosterone. The stress load suppresses the HPTA axis without providing the muscle-building signal.

— **Progressive overload matters** the body adapts. The testosterone response to a given weight diminishes over time as the body becomes efficient. Consistent progressive overload — adding weight, reps, or complexity over time — maintains the hormonal stimulus.

■ Key Research:

Remes K et al. (1985) Int J Sports Med; Kraemer WJ, Ratamess NA (2005) Sports Medicine; Hackney AC (2008) Current Sports Medicine Reports

■ Simply Put:

Your body makes more testosterone when it thinks it needs to build muscle. Heavy lifting is like sending your body an urgent message: "We need more testosterone — we're under mechanical load." Your body responds by cranking up production. Sitting still sends the opposite message: "Everything is fine, production not required." Move heavy things. It is literally a biological signal.

Action: Protocol: 3-4 sessions per week of compound resistance training. Prioritise: squats (any variation), deadlifts, hip thrusts, overhead press, rows. Progressive overload every 1-2 weeks. Training sessions 45-60 minutes maximum — longer sessions elevate cortisol and negate gains.

12 — SEDENTARY BEHAVIOUR & BODY FAT (AROMATASE)

Adipose tissue (body fat) is an endocrine organ. It contains high concentrations of aromatase — the enzyme that converts testosterone to oestrogen. The higher your body fat percentage, the more aromatase activity you have, and the faster testosterone is converted to oestrogen. This creates the vicious cycle: low testosterone makes fat loss harder; more fat increases aromatase; more aromatase reduces testosterone further. Sedentary behaviour amplifies this through reduced muscle mass (which is protective) and chronic low-level inflammation.

— **Visceral fat and aromatase** specifically, visceral fat (belly fat around organs) has the highest aromatase density. Reducing belly fat is one of the most effective ways to raise free testosterone.

— **Each 1% body fat reduction** associated with approximately 1-2% increase in free testosterone due to reduced aromatase conversion.

— **NEAT (non-exercise activity thermogenesis)** total daily movement — not just formal exercise — is a critical variable. Sedentary desk work with isolated gym sessions is far less effective than consistent daily movement. Walking is profoundly underrated as a hormonal intervention.

■ Key Research:

Blouin K et al. (2008) Trends Endocrinol Metab; Fui MN et al. (2014) Asian J Androl; Vermeulen A et al. (1996) J Clin Endocrinol Metab

■ Simply Put:

Fat tissue acts like a testosterone thief. It steals testosterone and converts it into oestrogen using a tool called aromatase. The more fat you carry — especially around your belly — the more of your testosterone gets stolen and converted. Losing fat is one of the most direct ways to increase testosterone without supplements.

DNA repair, NAD+, and mitochondrial health — the foundation of optimal testosterone.

Testosterone production is an energy-intensive cellular process. Leydig cells in the testes require functioning mitochondria, adequate NAD+ (the cellular energy currency), and intact DNA repair mechanisms to produce testosterone efficiently. The anti-ageing compounds that support cellular health are not separate to the testosterone protocol — they are the foundation on which all other interventions rest.

■ Simply Put:

Think of your cells like tiny factories. Each factory needs electricity (NAD+), working machinery (mitochondria), and intact blueprints (DNA). If the electricity runs low, the machinery gets old and rusty, or the blueprints get damaged — production drops. The cellular core supplements are like refurbishing the factory: new wiring, serviced machines, and repaired blueprints. Once the factory works properly, testosterone output rises naturally.

NMN (Nicotinamide Mononucleotide)

— **NAD+ precursor** NMN converts to NAD+ (nicotinamide adenine dinucleotide) — the fundamental molecule of cellular energy metabolism. NAD+ declines by approximately 50% between age 20 and 50. Leydig cells require high NAD+ to sustain testosterone synthesis.

— **Sirtuin activation** elevated NAD+ activates sirtuins — proteins that regulate DNA repair, mitochondrial biogenesis, and inflammation. SIRT1 and SIRT3 specifically protect Leydig cell function.

— **Research** Yoshino J et al. (Cell Metabolism, 2018) demonstrated NMN supplementation restored NAD+ levels in older adults to those of younger individuals. Mills KF et al. (Cell Metabolism, 2016) showed NMN improved energy metabolism, physical function, and insulin sensitivity in age-related decline.

— **Dosage to look for** 250-500mg NMN daily. Look for: sublingual form or pharmaceutical-grade capsule, third-party tested, stored correctly (refrigerated).

Resveratrol

— **Sirtuin activator and NMN synergy** resveratrol activates SIRT1 more powerfully in the presence of NMN/elevated NAD+. The two compounds work synergistically — NMN provides the fuel, resveratrol activates the engine that uses the fuel.

— **Aromatase inhibition** resveratrol has documented aromatase-inhibiting properties — it reduces the conversion of testosterone to oestrogen in adipose tissue. This is a direct testosterone-preserving mechanism.

— **Oestrogen receptor modulation** resveratrol is a selective oestrogen receptor modulator (SERM) — it blocks oestrogenic effects in reproductive tissue while maintaining beneficial effects elsewhere.

— **Research** Bhatt JK et al. (2012) Journal of Physiology and Biochemistry — resveratrol supplementation increased testosterone in obese animals via multiple mechanisms. Moutsatsou P (2007) Annals of the New York Academy of Sciences — resveratrol as SERM with anti-oestrogenic effects in male reproductive tissue.

— **Dosage** 250-500mg daily with a fat-containing meal. Look for: trans-resveratrol (not cis-resveratrol), from Japanese knotweed, third-party tested.

PQQ (Pyrroloquinoline Quinone)

— **Mitochondrial biogenesis** PQQ is one of the only known compounds that stimulates the growth of new mitochondria — a process called mitochondrial biogenesis. More mitochondria = more cellular energy = more testosterone-producing capacity in Leydig cells.

— **Antioxidant protection** PQQ is a novel redox cofactor that protects mitochondrial DNA from oxidative damage — which is the primary mechanism of mitochondrial ageing in reproductive cells.

— **NGF stimulation** PQQ stimulates nerve growth factor, which supports the neurological pathways involved in HPTA axis signalling.

— **Research** Rucker R et al. (2009) Nutrition Reviews — PQQ as an essential redox cofactor with unique mitochondrial biogenesis effects. Chowanadisai W et al. (2010) Journal of Biological Chemistry — PQQ stimulates mitochondrial biogenesis via PGC-1alpha pathway.

— **Dosage** 20mg daily with food. Look for: BioPQQ® or equivalent pure form, in veggie capsule.

Zinc

— **The testosterone mineral** zinc is involved in every step of the HPTA axis. It is required for GnRH release from the hypothalamus, LH release from the pituitary, testosterone synthesis in Leydig cells, and inhibition of aromatase. It is the most critical single mineral for male hormones.

— **Zinc and 5-alpha reductase** zinc inhibits 5-alpha reductase — the enzyme that converts testosterone to DHT in excess. At appropriate levels, zinc therefore maintains optimal testosterone/DHT balance.

— **Deficiency is common** zinc is depleted by sweating (athletes lose significant zinc in sweat), alcohol, phytates in grains, and is commonly suboptimal in Western diets. Even mild deficiency reduces testosterone by 25% in research studies.

— **Research** Prasad AS et al. (1996) Nutrition — zinc restriction reduced serum testosterone by 75% within 5 months; supplementation restored it. Kilic M et al. (2010) Neuro Endocrinology Letters — zinc supplementation during intense exercise maintained testosterone levels.

— **Dosage** 25-45mg elemental zinc daily (as zinc picolinate, gluconate, or bisglycinate — avoid oxide, poor absorption). Take with food. Do not exceed 50mg long-term without copper co-supplementation (8:1 zinc:copper ratio).

Magnesium

— **Free testosterone liberator** magnesium binds to SHBG (sex hormone binding globulin) — the protein that renders testosterone inactive. When magnesium occupies SHBG binding sites, more testosterone remains free and bioactive. This is one of the most underappreciated mechanisms in testosterone biochemistry.

— **Sleep quality and testosterone** magnesium glycinate is the most effective form for sleep — and sleep is when testosterone is produced. Improving sleep quality through magnesium supplementation has a documented downstream effect on testosterone.

— **Deficiency is near-universal** over 70% of Western adults are deficient in magnesium — primarily due to soil depletion, food processing, and alcohol consumption. Deficiency is associated with elevated cortisol (a testosterone antagonist).

— **Research** Cinar V et al. (2011) Biological Trace Element Research — 4 weeks of magnesium supplementation increased both free and total testosterone in athletes and sedentary men. Maggio M et al. (2014) Nutrients — magnesium and SHBG relationship confirmed in large population studies.

— **Dosage** 300-400mg elemental magnesium as glycinate or bisglycinate daily. Take in the evening — the sleep-improving effect is the secondary testosterone mechanism. Avoid oxide form — negligible absorption.

Vitamin D3 (High Dose)

— **Testosterone hormone** vitamin D3 is technically a steroid hormone, not a vitamin. Testosterone-producing Leydig cells contain vitamin D receptors (VDR) — vitamin D directly stimulates testosterone synthesis at the cellular level.

— **LH sensitivity** adequate vitamin D increases the sensitivity of Leydig cells to LH signalling — meaning the same amount of pituitary signal produces more testosterone output.

— **Aromatase inhibition** vitamin D reduces aromatase expression — less conversion of testosterone to oestrogen.

— **Deficiency and testosterone** men with optimal vitamin D levels (>30 ng/mL) have significantly higher testosterone than deficient men in multiple large population studies. Men in tropical regions (higher sun exposure) consistently show higher testosterone than matched populations at higher latitudes.

— **Research** Pilz S et al. (2011) Hormone and Metabolic Research — 12 months of vitamin D3 supplementation (3,332 IU/day) increased total testosterone by 25.2% vs placebo. Wehr E et al. (2010) Clinical Endocrinology — strong association between 25(OH)D levels and testosterone in large European male cohort.

— **Dosage** 4,000-6,000 IU D3 daily with K2 (100-200mcg MK-7). Always with a fat-containing meal. Check blood levels at 3 months — target 50-80 ng/mL (not the conventional 30 ng/mL "normal" — that is the deficiency cut-off, not the optimal range).

Ashwagandha (Withania somnifera)

— **Cortisol reduction — direct mechanism** withaferin A and withanolides in ashwagandha suppress the HPA axis response. In controlled trials, ashwagandha reduces morning cortisol by 14-32% compared to placebo. Lower cortisol = less pregnenolone steal = more substrate available for testosterone.

— **LH and FSH increase** ashwagandha has been shown to increase LH by up to 17% and FSH, directly stimulating the pituitary-gonadal axis to increase testosterone production.

— **Sperm quality** one of the most evidence-backed supplements for sperm quality — improving count, motility, and morphology in multiple controlled trials.

— **Research** Wankhede S et al. (2015) Journal of the International Society of Sports Nutrition — 600mg KSM-66 ashwagandha for 8 weeks increased testosterone by 15.4% and LH by 17.4% vs placebo. Ambiye VR et al. (2013) Evidence-Based Complementary and Alternative Medicine — significant improvements in sperm count (+167%), motility, and testosterone.

— **Dosage** 300-600mg KSM-66 or Sensoril extract daily. Look for: standardised extract (min 5% withanolides), root-only (not leaf). Take with food. Cycle: 8 weeks on, 2 weeks off.

Boron

— **Reduces SHBG** boron is a trace mineral that directly reduces sex hormone binding globulin (SHBG) — allowing more of the testosterone already in your blood to remain free and biologically active. A 10 mg/day boron intervention reduced SHBG by 24% in one week.

— **Increases free testosterone** by reducing SHBG, boron effectively increases free (bioavailable) testosterone without increasing total testosterone — a clinically meaningful distinction.

— **Oestrogen metabolism** boron reduces free oestradiol and increases its clearance — effectively shifting the testosterone:oestrogen ratio in the favourable direction.

— **Research** Naghii MR et al. (2011) Journal of Trace Elements in Medicine and Biology — 10mg boron supplementation for 4 weeks reduced SHBG, increased free testosterone by 28.3%, and reduced oestrogen. Pizzorno L (2015) Integrative Medicine — comprehensive review confirming boron's role in hormone regulation.

— **Dosage** 6-10mg daily as boron glycinate or calcium fructoborate. Look for: chelated form, with food.

Food as hormonal information. Every meal is a signal.

The nutritional framework for testosterone is not a calorie-counting system. It is a strategic approach to providing the raw materials, cofactors, and metabolic signals that the HPTA axis requires to function optimally. Every food choice either supports or suppresses hormonal output.

Omega-3 to Omega-6 Ratio: Ideal vs. Modern Western Diet

Ancestral Diet (optimal) — Modern Western Diet

1:2 omega-3 to omega-6 — ideal. Anti-inflammatory. Testosterone-supportive.

1:20 omega-3 to omega-6 — modern diet. Pro-inflammatory. Testosterone-suppressive.

Source: Simopoulos AP (2008) Nutrients. Ancestral diets had 1:1–1:4 ratio.

The Fat Priority

Testosterone is made from cholesterol. Adequate dietary fat — particularly saturated and monounsaturated fat — is a non-negotiable prerequisite for optimal hormone production. Low-fat diets consistently produce lower testosterone. The type of fat matters equally: saturated fats support steroidogenesis; polyunsaturated fats (seed oils) inhibit it.

TESTOSTERONE-SUPPORTING FOODS

✓ **Eggs (whole, including yolk)** — complete amino acid profile, cholesterol substrate, selenium, zinc, vitamin D. The yolk is where all the hormonal value is.

✓ **Fatty red meat (grass-fed)** — zinc, creatine, carnitine, B12, saturated fat for steroidogenesis. The most testosterone-associated dietary protein.

✓ **Oysters and shellfish** — gram for gram, the highest zinc density of any food. 6 oysters provide 32mg zinc — more than the daily therapeutic dose.

✓ **Avocado** — monounsaturated fat, potassium, B6, folate, vitamin K2. All directly support hormone production and reduce cortisol response.

✓ **Brazil nuts (2-3 daily)** — selenium — the primary antioxidant mineral protecting Leydig cells from oxidative damage. 2-3 nuts provides optimal selenium dose.

✓ **Pomegranate** — punicalagin and ellagic acid reduce aromatase activity, reduce oxidative stress in testicular tissue, and have documented testosterone-increasing effects in controlled trials.

✓ **Dark leafy greens (magnesium)** — spinach, kale, swiss chard — provide magnesium which liberates free testosterone from SHBG.

✓ **Ginger** — reduces TNF-alpha and oxidative stress in testicular tissue. 3 months of ginger supplementation increased testosterone by 17% in one controlled trial (Akhlaghi M et al. 2014).

✓ **Wild salmon and fatty fish** — omega-3 EPA and DHA directly reduce systemic inflammation, support LH receptor sensitivity, and improve testosterone:cortisol ratio.

✓ **Garlic (allicin)** — reduces cortisol secretion, protects from oxidative stress in Leydig cells, and increases LH sensitivity.

TESTOSTERONE-SUPPRESSING FOODS

✗ **All seed oils** — sunflower, canola, soybean, corn, cottonseed — direct StAR enzyme inhibitors. The primary dietary testosterone antagonist.

✗ **Refined sugar and high-fructose corn syrup** — insulin spike reduces testosterone by up to 25% for 2 hours. Fructose specifically increases uric acid which impairs Leydig cell function.

✗ **Soy protein isolate in excess** — phytoestrogens in isolated soy protein (not fermented soy) can compete with testosterone at receptor level. Moderate whole soy (tofu, edamame) in context of otherwise clean diet is less concerning than isolated soy protein in protein shakes.

✗ **Alcohol** — directly toxic to Leydig cells, increases aromatase activity, elevates cortisol, and reduces zinc absorption. Even moderate regular consumption (7+ drinks/week) is associated with 14% lower testosterone.

✗ **Flaxseed in large quantities** — lignans are potent phytoestrogens that can reduce free testosterone and DHT at high doses (>2 tablespoons/day).

✗ **Licorice root (and its products)** — contains glycyrrhizin which directly inhibits 17-beta hydroxysteroid dehydrogenase — the final enzyme in testosterone synthesis. Even small quantities have measurable effects.

✗ **Mint (spearmint and peppermint)** — anti-androgenic effects documented in multiple studies. Spearmint tea reduced free testosterone and DHT in women with elevated androgens — same mechanism applies to men.

A day built for peak testosterone.

This template integrates every element of the protocol into a practical daily structure. The sequence matters as much as the individual elements — many supplements have specific timing requirements relative to food and each other.

ON WAKING — 6-7AM

— **Morning sunlight (first 10 minutes)** direct outdoor light on face and arms. This sets circadian rhythm, suppresses residual melatonin, and begins the cortisol awakening response — the healthy morning cortisol peak that should rise sharply and then fall. Artificial light does not substitute.

— **Cold exposure** 30-60 second cold shower finish — or full cold shower. Reduces inflammatory cytokines, increases norepinephrine (which has direct anabolic signalling), and stimulates dopamine production which supports motivation and HPTA axis function. Build from 10 seconds over 2-3 weeks.

— **NMN sublingual or with water** 250-500mg on empty stomach or with water before food. NMN absorption is best fasted.

— **Zinc (if taken AM)** 25-45mg zinc picolinate if not taking with food later.

— **Breathwork — 5 minutes** box breathing (4-4-4-4) or coherent breathing (5.5:5.5). Activates parasympathetic nervous system, reduces morning cortisol spike, and sets the HPA axis tone for the day.

BREAKFAST — 7-8AM

— **High-quality protein and fat** 3-4 whole eggs (yolk essential), with grass-fed butter or ghee. Or grass-fed meat with vegetables. No refined carbohydrate at this meal.

— **Resveratrol** 250-500mg with your fat-containing meal — fat enhances absorption significantly.

— **Vitamin D3 + K2** 4,000-6,000 IU D3 + 100-200mcg K2 with fat. Critical to take with your fattiest meal of the day.

— **Ashwagandha** 300-600mg KSM-66 with food. AM dosing aligns with the cortisol reduction benefit.

— **PQQ** 20mg with food.

MID-MORNING

— **Movement** 20-30 minute walk outdoors. Post-meal walks reduce insulin spike, support gut motility, increase NEAT (non-exercise activity thermogenesis), and provide additional light exposure.

— **Omega-3 (if splitting dose)** 1-2 softgels with any small fat-containing snack.

— **No snacking if possible** allow 4-5 hours between meals for the migrating motor complex to activate — this self-cleaning gut wave is disrupted by continuous eating and directly impacts the gut microbiome that regulates oestrogen metabolism.

TRAINING — LATE AFTERNOON (4-6PM)

— **Optimal window for resistance training** testosterone naturally peaks between 3-6pm in most men. Training in this window produces the largest hormonal response and best performance output. If training in the morning is the only option — that is still far superior to not training.

— **Compound movement focus** squats, deadlifts, hip thrusts, overhead press, weighted rows. These large multi-joint movements produce the most significant testosterone stimulus. Minimum 3 sets per exercise, progressive overload.

— **45-60 minutes maximum** sessions longer than 60-75 minutes cause cortisol to rise significantly and can negate the testosterone benefit. Quality and intensity over duration.

— **Post-workout nutrition** protein and carbohydrate within 60 minutes. This is one of the appropriate times for carbohydrate — insulin post-workout drives amino acids into muscle without the hormonal suppression seen at other times.

EVENING MEAL — 6-7PM

— **Largest meal of the day here or at lunch** front-loading calories to the first two-thirds of the day supports circadian alignment of metabolism and hormone production.

— **Magnesium glycinate** 300-400mg with your evening meal. The sleep improvement is the secondary testosterone mechanism — magnesium must be taken consistently for 2-4 weeks before sleep effects are fully apparent.

— **Boron** 6-10mg with food.

— **Fermented foods** 2-4 tablespoons of kimchi, sauerkraut, or other fermented vegetable — support estrobolome and oestrogen clearance.

— **Finish eating by 7-8pm** begins the fasting window. Minimum 12 hours without food. 14-16 hours is optimal for testosterone — the fasted state upregulates LH pulsatility and testosterone sensitivity.

EVENING WIND-DOWN — 8-10PM

— **Screen off or blue light glasses** screens off 90 minutes before bed. If screens are unavoidable, use amber blue-light blocking glasses — these filter 480nm blue wavelength without affecting visual clarity.

— **Dim lighting throughout home** ceiling lights suppress melatonin even without screens. Use lamps, candles, or warm-spectrum lighting in the evening. The transition from bright to dim is the trigger for melatonin production.

— **Final breathwork** 10 minutes of extended exhale breathing: inhale 4 seconds, exhale 6-8 seconds. Activates the vagus nerve, lowers heart rate, and signals the hypothalamus that threat-assessment is complete.

— **Cool room — 16-19 degrees C** testosterone is produced maximally during deep sleep, which requires a cool core body temperature. Overheating during sleep is documented to reduce both sleep quality and testosterone.

— **Consistent bed and wake times** the single most impactful sleep intervention. Irregular sleep timing disrupts the circadian LH pulse pattern — the signal that drives overnight testosterone production.

What to measure. What the numbers mean. What your doctor won't tell you.

Standard blood panels tell you whether you are sick — not whether you are optimised. The reference ranges for most hormones are based on the average of a population whose testosterone is already in collapse. "Normal" on a 2026 blood panel means "average for a population with a hormone problem." These are the tests that matter and the ranges that reflect actual physiological optimisation.

Total Testosterone

400-600 ng/dL is "normal" by lab standards. Optimal for most men: 700-1000 ng/dL. Under 400 ng/dL = clinical hypogonadism. Over 600 ng/dL with symptoms suggests SHBG issue — check free testosterone.

Free Testosterone

the bioavailable fraction not bound to SHBG or albumin. This is what your cells actually use. Optimal: top 25% of reference range for your age. Low free testosterone with normal total = high SHBG problem (zinc, boron, magnesium deficiency).

SHBG (Sex Hormone Binding Globulin)

optimal: 20-30 nmol/L. Elevated SHBG renders testosterone inactive — even with "normal" total testosterone you can have functional hypogonadism. High SHBG is reduced by: boron, zinc, dietary fat, resistance training.

Oestradiol (E2)

optimal in men: 20-30 pg/mL. Under 15 pg/mL causes joint pain, low libido, poor mood. Over 40 pg/mL causes feminising effects, water retention, mood disruption. Elevated E2 = excessive aromatase = target body fat, zinc, vitamin D.

LH and FSH

LH drives testosterone production in the testes. Low LH with low testosterone = problem in the brain (hypothalamus or pituitary). High LH with low testosterone = problem in the testes. This distinction determines the intervention.

Vitamin D (25-OH)

lab "normal": 30 ng/mL. Optimal for testosterone: 50-80 ng/mL. The majority of men in northern latitudes are below optimal even with supplementation — measure and dose accordingly.

Zinc (serum or RBC)

serum zinc is an imperfect marker — red blood cell (RBC) zinc is more accurate. Optimal: upper third of reference range. Suboptimal zinc is one of the most common and addressable causes of suboptimal testosterone.

hsCRP (high-sensitivity C-reactive protein)

marker of systemic low-grade inflammation — the type that suppresses the HPTA axis. Optimal: below 0.5 mg/L. Above 1.0 mg/L indicates significant inflammatory load. Address through diet (seed oil removal, omega-3), sleep, and stress.

Cortisol (morning)

morning serum or saliva cortisol. Optimal: sharp morning peak at 8am (8-18 mcg/dL) that declines through the day. A blunted morning peak = HPA axis burnout. Elevated evening cortisol = chronic stress pattern that will suppress testosterone regardless of supplementation.

Sperm Analysis (semen analysis)

for any man considering fertility in the next 1-5 years: baseline semen analysis. WHO reference values are minimum thresholds, not optimal targets. Motility, morphology, and count all respond to the protocol within 74-90 days (one complete sperm production cycle).

■ Simply Put:

Getting blood tests is like checking the dials on the control panel of your hormone factory. Without the dials, you're flying blind — you think the supplements might be working but you don't actually know. With blood tests every 3 months during the active protocol, you can see exactly what's moving and adjust. The goal is not a "normal" reading — it's an optimal one.

What happens when. What to expect.

Testosterone recovery is not linear and it is not instantaneous. Sperm production takes 74-90 days for a complete cycle. Leydig cell recovery from chronic suppression takes 6-12 weeks. Microbiome restoration takes 8-12 weeks. Plan accordingly.

WEEK 1-2

REMOVE & FOUNDATION

- — Complete removal: all seed oils, processed food, plastics exposure, conventional dairy reduction, alcohol
- — Begin: NMN, Vitamin D3+K2, Magnesium glycinate, Zinc picolinate, Omega-3
- — Establish: morning sunlight, cold exposure (10 seconds), consistent wake time
- — Days 3-7: possible fatigue, headache, cravings — microbiome and metabolic transition. Push through.
- — Week 2: energy begins to stabilise, sleep quality typically improves noticeably

WEEK 3-4

REPAIR PHASE

- — Add: Resveratrol, PQQ, Ashwagandha KSM-66, Boron
- — Increase cold exposure to 30-60 seconds
- — Establish resistance training: 3x per week, compound movements, progressive overload begins
- — Post-meal walking becomes consistent daily habit
- — Week 4: most men report improved morning erections (a direct testosterone biomarker), improved mood and motivation

MONTH 2

ACTIVE RECOVERY

- — Full supplement stack in place — optimise timing and doses
- — Resistance training: 3-4x per week, progressive overload every 1-2 weeks
- — Introduce intermittent fasting if not already: 14-16 hour overnight fast
- — First blood test: check testosterone (total and free), SHBG, oestradiol, vitamin D, zinc
- — Month 2: significant energy, libido, and body composition improvements in most men. Visible muscle gain if training is consistent.
- — Sperm quality beginning to improve — one sperm cycle is 74 days

MONTH 3

CONSOLIDATION

— Second blood test — compare to baseline. Adjust supplementation based on results.

— If vitamin D still suboptimal at 3 months: increase dose. If oestradiol elevated: focus on body fat reduction and zinc.

— Transition resistance training to 4x per week if response has been good

— Consider adding advanced protocols: sauna (2-3x/week), contrast therapy

— Sperm analysis if fertility is the goal: the 90-day mark is when full sperm cycle impact is measurable

— Month 3: most men who have maintained the full protocol report being at their best in years. The lifestyle changes are now habits rather than efforts.