

Low testosterone

Confirm low testosterone with two morning blood draws, check LH and FSH to see if the testis or brain is the problem, then treat only if you have real symptoms and it is safe.

THE ONE-LINE TRUTH

Low testosterone means the testis itself is not making enough hormone, or the brain signals that tell it to make testosterone are turned off.

The chain — how it unfolds

1. The testis stops making testosterone (primary failure from Klinefelter, trauma, chemo, or aging), or the pituitary stops sending LH (secondary failure from obesity, opioids, tumor, or prolactin). — why: Testosterone is made only in the Leydig cells of the testis, and those cells work only when LH arrives as the on-switch—so if either the factory or the on-switch breaks, testosterone drops.
2. Muscles all over the body start to shrink and weaken (sarcopenia), especially in the arms, legs, and core. — why: Testosterone binds to receptors inside muscle cells and turns on the genes that build new protein and repair damage; without that signal, muscle breakdown (proteolysis) runs faster than rebuilding, so mass and strength fade.
3. Bones lose density and become fragile (osteoporosis), raising the risk of hip, spine, and wrist fractures. — why: Testosterone keeps osteoblasts (bone-building cells) busy and tells osteoclasts (bone-chewing cells) to slow down; when testosterone drops, bone chewing outpaces bone building, so bones thin and crack more easily.
4. Energy drops, motivation disappears, and mood sinks into depression that does not lift with usual treatments. — why: Testosterone acts in the prefrontal cortex (the brain's planning and focus center) and the limbic system (the mood and reward center) to keep energy high and mood stable; without it, those circuits run cold, causing fatigue, poor concentration, and flat or sad mood.
5. Interest in sex fades (low libido), and erections become weak or disappear (erectile dysfunction). — why: Testosterone fuels the brain's sexual-interest circuits and also helps blood vessels in the penis relax and fill during arousal; low levels turn off desire in the brain and starve the mechanics below.

6. Body fat increases, especially around the belly (central adiposity), and muscle-to-fat ratio flips. — why: Without testosterone's muscle-building push, the body stores more calories as fat instead of muscle; belly fat then makes the problem worse by turning testosterone into estrogen (via the aromatase enzyme), further lowering active testosterone.
7. Red blood cell count may drop slightly, causing mild anemia and adding to fatigue. — why: Testosterone tells the kidneys to release erythropoietin (the hormone that orders the bone marrow to make red blood cells); less testosterone means less erythropoietin and fewer oxygen carriers.
8. All these problems trace back to one broken pipe—either the testis itself or the brain signal that runs it—so fixing that one upstream break (with testosterone replacement if safe, or treating the pituitary tumor, stopping the opioid, or losing weight) can reverse the whole cascade. — why: Every downstream symptom (weak muscles, thin bones, low mood, no sex drive, belly fat) is the body's response to missing one key hormone; replace the hormone or fix the signal, and the dominoes run backward—muscle rebuilds, bone hardens, mood lifts, and energy returns.

Spot it — what you see, and why

- Low sex drive (reduced interest in sex): Testosterone is the main hormone that powers sexual desire in men. When levels drop, the brain's signals for wanting sex get weaker, so interest fades.
- Trouble getting or keeping erections: Testosterone helps the blood vessels in the penis relax and fill with blood to create an erection. Low testosterone makes this process less reliable, though most erection problems actually come from blood-flow issues rather than low testosterone alone.
- Fatigue and low energy all day: Testosterone helps power muscle cells and brain circuits that keep you alert and energized. When it drops, cells work less efficiently, like a battery running low, so you feel drained even after rest.
- Loss of muscle mass and strength: Testosterone tells muscle cells to build and maintain protein. Without enough, muscles shrink over time and get weaker, even if you stay active.
- Increase in body fat, especially around the belly: Low testosterone shifts how the body stores energy. Fat cells multiply more easily and muscles burn less fuel, so fat builds up, especially in the abdomen.
- Mood changes: feeling down, irritable, or less motivated: Testosterone helps regulate mood circuits in the limbic system (the brain's emotional center). Low levels can dampen motivation and make emotions feel heavier or more fragile.

Red flags — act now

- Severe, sudden-onset headaches or vision changes—may signal a pituitary tumor pressing on the optic nerves.
- Very high red blood cell count (hematocrit above 54%) on testosterone therapy—raises the risk of dangerous blood clots in the heart, lungs, or brain.
- Rapid breast growth or a hard lump in the breast—could be breast cancer, which is rare in men but more common when hormone balance is off.
- Testicular lump, pain, or one testicle much smaller than the other—may indicate testicular cancer or severe damage to testosterone-making cells.

Treat it — in this order

1. Identify and reverse any fixable causes first: lose weight if obese, treat obstructive sleep pauses in breathing (apnea) with CPAP, stop or lower opioid medications, reduce heavy alcohol use → Obesity, sleep pauses in breathing (apnea), opioids, and alcohol all suppress the hypothalamus and pituitary, lowering their output of GnRH and LH without damaging the testis. Fixing these causes often brings testosterone back up naturally within months, without needing hormone replacement.
2. Testosterone replacement therapy — choose from intramuscular injection (testosterone cypionate or enanthate every 1-2 weeks), daily transdermal gel, transdermal patch, or subcutaneous pellet implants every 3-6 months → Raises blood testosterone back to normal range (300-1000 ng/dL), which restores libido, sexual function, energy, mood, muscle mass, bone density, and red blood cell production. It replaces the hormone the body can no longer make.
3. For men who need to preserve or restore fertility: clomiphene citrate (25-50 mg daily or every other day) or human chorionic gonadotropin (hCG, 1500-3000 units subcutaneously 2-3 times per week) → Clomiphene blocks estrogen receptors in the hypothalamus and pituitary, tricking them into making more GnRH and LH, which wakes up the testis to produce both testosterone and sperm. hCG mimics LH and directly tells the testis to make testosterone and sperm. Both keep the testis working instead of shutting it down.
4. Monitor hematocrit and hemoglobin every 3-6 months, PSA and digital rectal exam yearly, and total testosterone level 3-6 months after starting therapy to confirm the dose is right → Catches dangerous side effects early. Hematocrit above 54% means blood is too thick and clot risk is rising — dose must be lowered or temporarily stopped. PSA rising faster than 1.4 ng/mL per year or climbing above 4.0 ng/mL raises concern for prostate cancer. Checking testosterone level confirms you are in the target range (300-1000 ng/dL).

5. Stop testosterone immediately if hematocrit exceeds 54%, PSA rises sharply or prostate nodule is found, severe untreated obstructive sleep pauses in breathing (apnea) is discovered, or heart failure worsens → Removes the fuel driving dangerous side effects. Stopping testosterone lets hematocrit fall, removes the growth signal to any hidden prostate cancer, and stops fluid retention that can worsen heart failure or sleep pauses in breathing (apnea).

Your top priorities at the bedside

1. Schedule two separate morning fasting blood draws before 10 AM for total testosterone, LH (luteinizing hormone), and FSH (follicle-stimulating hormone) at least one week apart — why: Testosterone levels bounce up and down daily and peak in early morning; two low results confirm real deficiency, and LH plus FSH tell whether the problem is in the testis or the brain
2. Screen for reversible causes by asking about opioid use, measuring BMI (body mass index), and referring for sleep study if the patient snores or has daytime sleepiness — why: Obesity, sleep pauses in breathing (apnea), and opioid medicines all lower testosterone but can be fixed without hormone replacement; treating these first may restore normal levels naturally
3. Check baseline hematocrit (percentage of red blood cells), prostate-specific antigen (PSA, a protein made by the prostate), blood pressure, and lipid panel before starting testosterone therapy — why: Testosterone raises red blood cell production, which can cause dangerously thick blood leading to clots; baseline numbers let you catch polycythemia early during treatment monitoring