

# Erectile Dysfunction

Erectile dysfunction (trouble getting or keeping an erection) is a blood vessel problem until proven otherwise — especially in younger men — and often the first warning sign of silent heart disease.

## THE ONE-LINE TRUTH

The penis cannot get hard enough for sex or stay hard long enough to finish.

## The chain — how it unfolds

1. Blood vessel lining (endothelium) gets damaged by diabetes, high cholesterol, smoking, or high blood pressure. — why: The endothelium makes nitric oxide, the key signal that relaxes the smooth muscle around penile arteries. When it is injured, nitric oxide production drops, arteries stay stiff, and blood cannot rush in to fill the penis.
2. Atherosclerosis (cholesterol plaques) narrows the small arteries feeding the penis. — why: The penile arteries are only 1–2 mm wide, so even small plaques choke off flow. Less blood in means a weak or absent erection, and the same plaques are quietly growing in the heart and brain arteries at the same time.
3. The penis cannot get hard, or it gets partially hard then goes soft quickly. — why: Not enough blood flows in (arterial problem), or blood leaks back out through veins that will not close (venous leak). Either way, pressure never builds high enough to make the penis firm and keep it firm.
4. Morning and spontaneous erections disappear (if the cause is physical). — why: REM-sleep erections depend on the same blood vessels, nerves, and hormones. When those are broken, even the automatic reflex fails. This is the body's clue that the problem is organic, not just in the mind.
5. The man may feel shame, avoid intimacy, or become depressed. — why: Erectile dysfunction hits identity and relationships hard. The emotional fallback can worsen the physical problem (stress tightens vessels) and delay care, letting the upstream vascular disease silently advance toward heart attack or stroke.
6. Two to five years later, the same atherosclerosis may cause chest pain (angina), heart attack, or stroke. — why: The coronary and carotid arteries are wider (3–4 mm), so they clog later than the penile arteries. Erectile dysfunction is often the first — and sometimes only — warning that systemic vascular disease is present and progressing.

## Spot it — what you see, and why

---

- Trouble getting or keeping an erection firm enough for sex: Blood vessels in the penis may not open wide enough or may leak blood back out too quickly, so the spongy chambers inside the penis can't fill and stay firm. This can happen because the lining of the vessels is damaged (from high blood sugar, high cholesterol, or smoking), the nerves that trigger the process are injured (from diabetes or surgery), or testosterone (the main male sex hormone) is too low.
- Erections that are softer than they used to be: The small arteries feeding the penis slowly stiffen and narrow over time, especially if cholesterol builds up in their walls or high blood pressure damages them. Less blood flowing in means the penis fills less fully, so erections feel less rigid.
- Normal erections during sleep or in the morning, but trouble during partnered sex: Nighttime and morning erections are automatic reflexes controlled by the brainstem (the oldest part of the brain that runs basic body cycles) and happen when testosterone pulses overnight. If those work fine but daytime erections fail, it usually means the blood vessels and nerves are healthy — instead, stress, anxiety, or relationship worry is blocking signals from the prefrontal cortex and limbic system (the parts of the brain that process emotion and desire), so arousal doesn't translate into a physical response.
- Trouble began suddenly after a stressful event, new relationship worry, or depression: High stress or low mood floods the body with cortisol (the main stress hormone) and drops dopamine and serotonin (brain messengers that power motivation and pleasure). The sympathetic nervous system (the body's fight-or-flight mode) stays switched on, which clamps down blood vessels all over the body — including in the penis — and overrides the parasympathetic nervous system (the rest-and-digest mode that opens vessels and allows erections).
- Gradual worsening over months or years, especially with diabetes, high blood pressure, or high cholesterol: Chronic high blood sugar damages the endothelium (the inner lining of blood vessels) and the small nerves that sense touch and trigger erection signals. High blood pressure and high cholesterol stiffen artery walls and cause plaque to build up, narrowing the tiny arteries in the penis first because they are the smallest in the body. Over time, less and less blood can get through.
- Low interest in sex or low energy overall: Testosterone (made mainly in the testes) is the hormone that drives libido, energy, and the brain's desire circuits. When levels drop — from aging, obesity, chronic illness, or pituitary gland problems — the brain's reward centers (including the nucleus accumbens) receive weaker signals, so sexual interest fades and erections become harder to trigger even when the blood vessels are healthy.

## Red flags — act now

---

- New trouble with erections plus chest pain, shortness of breath, or pain in the legs when walking — may signal blocked arteries in the heart or legs that need urgent care
- Sudden complete loss of all erections including morning ones, especially after pelvic surgery, radiation, or a bike or straddle injury — may mean nerve or blood-vessel damage
- Erection lasting more than four hours (priapism) — trapped blood can clot and destroy the spongy tissue, causing permanent damage if not drained quickly
- New numbness or tingling in the groin, trouble controlling the bladder or bowels, or weakness in the legs — may signal spinal-cord compression that needs emergency imaging and treatment

## Treat it — in this order

---

1. Lifestyle modification — exercise 150 minutes per week (brisk walking, cycling, swimming), lose weight if BMI  $\geq 25$ , stop smoking completely, limit alcohol to  $\leq 2$  drinks per day, and control blood sugar and blood pressure to target → Exercise and weight loss restore endothelial function (the ability of blood vessel lining to make nitric oxide, the gas that opens penile arteries). Stopping smoking removes toxins that poison nitric oxide and constrict vessels. Controlling diabetes (A1c  $< 7\%$ ) and high blood pressure (hypertension) (BP  $< 130/80$ ) halts nerve and vessel damage. This treats the root cause — atherosclerosis and metabolic disease — in 30 to 40% of men if started early.
2. PDE5 inhibitor — sildenafil 50–100 mg taken 1 hour before sex, or tadalafil 10–20 mg taken 30 minutes before sex (or tadalafil 5 mg daily if sex is frequent) → Blocks phosphodiesterase-5 (PDE5), the enzyme that breaks down cGMP (cyclic guanosine monophosphate, the molecule that keeps penile smooth muscle relaxed). When cGMP stays high, blood vessels stay open longer and more blood pools in the corpora cavernosa (the spongy chambers in the penis that fill with blood to create an erection). Works in 60 to 70% of men with vascular erectile dysfunction. Effect lasts 4 hours for sildenafil, up to 36 hours for tadalafil.
3. Stop or switch the offending medication — change SSRI to bupropion (does not raise serotonin), switch beta-blocker or thiazide diuretic to an ACE inhibitor or ARB, taper and stop opioids if possible, stop finasteride, avoid antihistamines → Removes the drug that is blocking nitric oxide release, lowering testosterone, or poisoning nerve signals. Bupropion raises dopamine and norepinephrine (chemicals that enhance arousal and do not block erections). ACE inhibitors and ARBs lower blood pressure without reducing penile blood flow. Stopping finasteride restores DHT (dihydrotestosterone, an androgen needed for genital tissue health). Erectile function often returns within 2 to 6 weeks after the toxic drug is cleared.

4. Testosterone replacement therapy (topical gel 50–100 mg daily, or intramuscular injection 100–200 mg every 2 weeks) — ONLY if morning total testosterone is confirmed < 300 ng/dL on two separate tests → Restores testosterone to normal range (300–900 ng/dL), which primes nitric oxide synthase in penile nerves, maintains smooth muscle health in the corpora cavernosa, and restores libido (sexual desire). Works only in men with true hypogonadism. Improves erections in 40 to 50% of hypogonadal men, often combined with a PDE5 inhibitor.
5. Cognitive-behavioral therapy (CBT) or couples sex therapy with a licensed therapist — 8 to 12 weekly sessions focused on performance anxiety, communication, relationship conflict, and gradual exposure (sensate focus exercises) → Reduces activity in the amygdala (the brain's alarm center that flags danger and triggers the sympathetic nervous system to release adrenaline, which constricts penile blood vessels). Builds activity in the prefrontal cortex (the front of the brain that pumps the brakes on fear and allows the parasympathetic nervous system to send the relax signal that releases nitric oxide). Treats performance anxiety, depression, and relationship stress — the main psychological causes of erectile dysfunction. Works in 50 to 70% of men with pure psychological erectile dysfunction.

## Your top priorities at the bedside

---

1. Screen for heart disease by asking about chest pain during exercise and checking blood pressure and pulse in both arms — why: Erection failure and heart attacks share the same cause, which is plaque blocking arteries, and the small penis arteries show damage 3 to 5 years before a heart attack happens
2. Measure waist size, body mass index, and ask about exercise habits to identify obesity and sedentary lifestyle — why: Belly fat makes an enzyme called aromatase that turns testosterone into estrogen, lowering the male hormone needed for erections, and exercise reverses this process
3. Check hemoglobin A1c or fasting blood sugar to find undiagnosed diabetes — why: High blood sugar damages the endothelium lining of blood vessels and the autonomic nerves controlling erection, and fixing glucose under 7 percent improves blood flow