

Hyperthyroidism

Hyperthyroidism means the thyroid is making way too much hormone, so your whole body runs too fast — like a car stuck in high gear that cannot slow down.

THE ONE-LINE TRUTH

Thyroid hormone is your body's speed dial — it sets how fast your heart beats, how much heat you make, and how quickly you burn food for energy.

The chain — how it unfolds

1. Too much T3 floods your bloodstream. — why: The upstream break (Graves antibodies, a hot nodule, or thyroid inflammation) drives the thyroid to make or release way more T4 and T3 than normal. T3 is the active hormone that plugs into receptors in almost every cell.
2. Your heart races (tachycardia, often 90–140 bpm at rest) and beats harder. — why: T3 makes beta-1 adrenergic receptors on heart muscle extra sensitive to adrenaline (epinephrine) and norepinephrine. It also tells heart cells to make more receptors. The sinoatrial node (your heart's natural pacemaker in the right atrium) fires faster, and the ventricles squeeze harder. Cardiac output (how much blood your heart pumps per minute) goes up. Over time, the top chambers can start beating chaotically (atrial fibrillation), which raises stroke risk because blood can pool and clot in the atrium.
3. Your skin feels warm, flushed, and sweaty. — why: High T3 cranks up your basal metabolic rate, so every cell makes more heat. To dump that heat, blood vessels in your skin dilate (widen). Warm blood flows to the surface, your skin flushes, and sweat glands turn on to cool you by evaporation. You feel hot even in a cool room and you sweat a lot.
4. You lose weight even though you are eating more. — why: T3 tells your cells to burn glucose and fat faster (increased oxygen consumption and heat production in mitochondria, the cell's power plants). Your body uses up calories faster than you can eat them. Muscle protein also breaks down (catabolism) to feed the revved-up engine, so you lose both fat and muscle mass.

5. You feel jittery, anxious, or cannot sleep. — why: T3 amplifies the sympathetic nervous system (your fight-or-flight response). The locus coeruleus (a tiny cluster in your brainstem that makes norepinephrine, the brain's version of adrenaline) becomes hyperactive. The amygdala (your brain's alarm center for detecting danger) fires more easily. The prefrontal cortex (the front part of your brain that usually puts the brakes on big emotions) has a harder time calming things down. You feel wired, on edge, and your mind races. You may have tremor (shaky hands) because motor neurons are extra excitable.
6. You have frequent bowel movements or diarrhea. — why: T3 speeds up gut motility (how fast food moves through your intestines). The enteric nervous system (the nerve network in your gut wall) fires faster, and smooth muscle in the intestines contracts more often, pushing food through quickly. Less water is absorbed, so stools are loose.
7. Your bones break down faster, and you can develop osteoporosis or high blood calcium. — why: T3 revs up bone remodeling. Osteoclasts (cells that dissolve old bone and release calcium into the blood) work faster than osteoblasts (cells that build new bone). Over months to years, bone density drops, raising fracture risk, especially in post-menopausal women. Blood calcium can tick up because bone is releasing it.
8. In thyroid storm, all these effects spiral out of control. — why: A trigger (infection, surgery, stopping anti-thyroid medicine suddenly, trauma, or childbirth) pushes T3 levels even higher or unmasks the body's inability to cope. Fever spikes above 104°F because the hypothalamus (your brain's thermostat) is overridden. Heart rate climbs above 140; atrial fibrillation (an irregular, quivering heartbeat) or heart failure sets in because the heart cannot keep up the pace. Confusion, agitation, or seizures happen because the brain is overheated and overstimulated. Severe vomiting and diarrhea cause dehydration and shock. Multi-organ failure follows. This is a medical emergency with 10–30% mortality even with ICU care (IV beta-blockers like esmolol or propranolol to slow the heart, IV hydrocortisone because stress can unmask adrenal insufficiency, methimazole or PTU to block new hormone production, iodine solution one hour later to block hormone release, cooling blankets, IV fluids, and treating the trigger infection or stress).

Spot it — what you see, and why

- Fast heart rate (often over 100 beats per minute, even at rest): Too much thyroid hormone (the body's main speed-control chemical) pushes the heart to pump faster and harder, like stepping on a car's gas pedal
- Fine shaking of the hands (tremor): Extra thyroid hormone revs up the nervous system, making muscles fire too quickly and causing a fine, rapid shake you can see when you hold your hands out

- Warm, sweaty skin: Thyroid hormone cranks up the body's metabolism (how fast cells burn fuel), generating extra heat—the body sweats to cool down, even when the room feels normal
- Weight loss despite eating normally or more: Thyroid hormone speeds up how fast the body burns calories, so even if you eat the same or more, you lose weight because you're burning fuel faster than you can replace it
- Feeling nervous, worried, or jittery: Too much thyroid hormone overactivates the amygdala and other brain circuits that control alertness and emotion, making you feel on edge or anxious, like you've had too much caffeine
- Missed or irregular periods in women: High thyroid hormone disrupts the normal signals between the hypothalamus (the brain's hormone control center) and the ovaries, throwing off the monthly cycle

Red flags — act now

- Fever over 104°F with confusion or agitation (possible thyroid storm)
- Heart rate above 140 at rest, chest pain, or trouble breathing (heart strain or failure)
- Sudden severe vision loss or eye pain (rare but urgent eye complication in Graves disease)
- New weakness in arms or legs, especially with low potassium on labs (thyrotoxic periodic paralysis)

Treat it — in this order

1. Beta-blocker (propranolol 10–40 mg every 6–8 hours, or atenolol 25–100 mg daily) → Blocks beta receptors in the heart and nerves so your heart slows down, shaking stops, and you feel calmer within hours. This buys time while the real thyroid problem gets fixed.
2. Methimazole (10–40 mg daily; or propylthiouracil 100–150 mg three times daily in first trimester pregnancy or thyroid storm) → Stops the enzyme thyroid peroxidase inside the thyroid gland so it cannot make new T4 and T3 hormone. Hormone levels drop over weeks, and the body slows back to normal speed.
3. Radioactive iodine (I-131, single oral dose) → Destroys thyroid cells from the inside because iodine collects in the thyroid and the radiation kills the cells. Hormone levels drop and stay low, fixing hyperthyroidism permanently.
4. Thyroid surgery (partial or total thyroidectomy) → Removes the overactive part of the gland physically, so no more hormone can be made. Fixes the problem immediately during the operation.

5. Corticosteroid (prednisone 40 mg daily, tapered over weeks) for subacute or silent thyroiditis → Calms inflammation in the thyroid gland so it stops leaking stored hormone into the blood. Hormone levels drop as the swelling goes down.

Your top priorities at the bedside

1. Monitor heart rate and rhythm every 2 to 4 hours and report rate above 120 or new irregularity immediately — why: Excess thyroid hormone increases cardiac output (amount of blood the heart pumps) and can trigger atrial fibrillation (an irregular, quivering heartbeat); rapid rates above 150 can cause demand starved blood flow (ischemia) (heart muscle not getting enough oxygen) even without blocked arteries
2. Check temperature every 4 hours and notify provider if it rises above 100.4°F — why: Thyroid hormone increases basal metabolic rate (baseline energy burn), so patients already run warm; fever above 100.4°F may signal infection or early thyroid storm, which has 20 to 30 percent mortality even with treatment
3. Administer beta-blocker medication as prescribed and hold if heart rate is below 60 or systolic blood pressure is below 100 — why: Beta-blockers like propranolol block adrenaline receptors to slow heart rate and reduce tremor and anxiety within hours; they do not lower thyroid hormone but control dangerous cardiac effects while waiting for anti-thyroid drugs to work over weeks