

Hashimoto thyroiditis

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THE STORY IN ONE SENTENCE

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“Hashimoto thyroiditis means your immune cells mistakenly attack your thyroid gland. The gland weakens and stops making enough thyroid hormone (the fuel that keeps your body's engine running). Treatment is simple: take a pill of the missing hormone—levothyroxine—every day.”

Normal anatomy — the body's job

The thyroid gland sits in the front of your neck and makes thyroid hormone—mostly T4 and a little T3—that travels through your blood and tells every cell how fast to work. A small gland in your brain, the pituitary, watches the blood and sends out TSH when thyroid hormone drops, telling the thyroid to make more. Think of TSH as the pituitary's phone call to the thyroid saying 'we need more hormone.' This feedback loop keeps your body's energy level steady.

BODY'S JOB

Thyroid hormone is like the gas pedal for your body. It sets the speed for your heart, your gut, your brain, your skin, your hair—everything. When you have the right amount, your cells burn fuel at the right speed to keep you warm, awake, moving your bowels, and thinking clearly. The pituitary watches and adjusts the thyroid's output minute by minute so you stay balanced.

1. The pituitary gland (a pea-sized gland hanging under your brain) measures thyroid hormone in your blood every moment.
2. If thyroid hormone drops, the pituitary releases more TSH into the blood.
3. TSH travels to the thyroid gland in your neck and tells it to make more hormone.
4. The thyroid uses iodine from your food and an enzyme called thyroid peroxidase (TPO) to build T4 and T3.

5. T4 and T3 leave the thyroid and travel in the blood to every cell in your body.
6. Inside each cell, thyroid hormone turns on genes that tell the cell to burn fuel faster and make energy.
7. When thyroid hormone rises back to normal, the pituitary sees it and lowers TSH—this is the brake that keeps the system from overshooting.

What breaks

Your immune system's B cells and T cells, which normally attack bacteria and viruses, start making antibodies and inflammatory signals against thyroid peroxidase (TPO)—the enzyme your thyroid needs to build hormone. Over months and years, this chronic attack damages and kills thyroid cells, so the gland shrinks and makes less T4 and T3. As thyroid hormone drops, your pituitary sees the low level and pumps out more and more TSH trying to whip the dying gland into action, but the gland cannot respond because too many of its cells are dead.

CLINICAL TERM

Autoimmune destruction of thyroid follicular cells mediated by anti-TPO antibodies, anti-thyroglobulin antibodies, and T-lymphocyte infiltration, leading to progressive primary hypothyroidism with elevated TSH and low free T4.

How the body compensates

When thyroid hormone starts dropping, your pituitary tries to rescue you by cranking up TSH, which can keep T4 borderline normal for a while—this is called subclinical hypothyroidism. During this window, you may feel tired or cold but labs look almost okay, so the problem can be missed. Eventually the thyroid cannot keep up and T4 falls, TSH climbs higher, and full hypothyroidism sets in. If untreated for a long time, severe hypothyroidism can lead to myxedema coma—a life-threatening state with very low body temperature, slow heart rate, confusion, and coma—especially triggered by cold, infection, or sedating drugs. Starting thyroid replacement reverses most symptoms in weeks, but giving too much levothyroxine (or starting a high dose too fast in someone with heart disease) can trigger atrial fibrillation (an irregular, quivering heartbeat) or angina.

1. {'stage': 'Early (subclinical hypothyroidism)', 'what': 'TSH rises above 4.5–10 mIU/L, but free T4 is still in the normal range. You may feel more tired, cold, or foggy than usual, but many people have no symptoms yet.'}
2. {'stage': 'The dangerous middle', 'what': 'Symptoms are present but may be vague—fatigue, weight gain, constipation, dry skin—so both patient and doctor may blame stress, aging, or depression instead of checking TSH. The patient slowly gets worse while looking 'stable.'']}

3. {'stage': 'Overt hypothyroidism', 'what': "TSH climbs above 10 mIU/L and free T4 falls below normal. Now fatigue is severe, weight gain is clear, skin is puffy (especially face and ankles), hair thins, periods become heavy or irregular, and thinking slows. Heart rate drops (bradycardia), and the heart's pumping can weaken, causing shortness of breath and fluid buildup."}
4. {'stage': 'The crash point: myxedema coma', 'what': "If severe hypothyroidism goes untreated—especially during infection, cold exposure, or after taking sedatives or narcotics—the body's metabolism drops so low that body temperature falls below 95°F, breathing slows, carbon dioxide builds up, blood pressure drops, and the person becomes confused or unconscious. This is a medical emergency with high mortality even with ICU care."}
5. {'stage': 'Risk of overtreatment', 'what': 'Starting levothyroxine reverses hypothyroidism, but if you give too much too fast—especially in older adults or people with coronary artery disease—the sudden rise in metabolism can trigger chest pain (angina), heart attack, or atrial fibrillation (an irregular, quivering heartbeat). That is why we start low (often 25–50 mcg) and go slow, checking TSH every 6–8 weeks and adjusting the dose until TSH is in the normal range (usually 0.5–2.5 mIU/L).'} }
6. {'stage': 'Watch the trend, not the snapshot', 'what': 'A single normal TSH does not mean the patient is fine if symptoms are getting worse. Repeat labs every few months in early disease. Likewise, a patient on treatment who feels good but has a rising TSH needs a dose increase before symptoms return.'}
7. {'stage': 'A stable patient on a downhill slope is not really stable', 'what': 'If TSH is climbing from 8 to 12 to 18 over six months, the patient is decompensating even if they look okay today. Start treatment before they hit the crash point, because once myxedema coma begins, the window to reverse it safely is narrow.'}

Domino effect

1. You feel exhausted all the time, even after a full night of sleep. — Every cell in your body needs thyroid hormone to make energy. When T4 and T3 drop, your cells burn fuel more slowly, so your muscles make less ATP (the energy molecule), your brain gets less fuel, and you feel wiped out. It is like trying to drive a car with the engine stuck in first gear.
2. You gain weight even though you are eating the same amount—or even less—than before. — Thyroid hormone sets your basal metabolic rate—the number of calories you burn just sitting still. When hormone drops, your cells burn fewer calories, so extra energy from food gets stored as fat instead of being used. Your gut also slows down, so you absorb more calories and hold more water, adding pounds on the scale.

3. You feel cold all the time; you need a sweater when everyone else is comfortable. — Thyroid hormone tells your hypothalamus (the brain's thermostat) what your body temperature should be. Low hormone lowers the set-point, so your brain thinks you are too warm and stops generating heat. Your muscles shiver less, your blood vessels in the skin stay narrow to save heat, and you feel freezing even in a warm room.
4. You get constipated—bowel movements become hard, dry, and rare, maybe only once or twice a week. — Your intestines are ringed with smooth muscle that squeezes food along in waves called the gut's squeezing waves (peristalsis). Thyroid hormone keeps that muscle active. When hormone drops, the muscle contracts more slowly, so food sits in your colon longer. The colon absorbs more water out of the stool, leaving it hard and difficult to pass.
5. Your skin becomes dry, rough, and flaky; moisturizer stops helping. — Skin cells normally turn over every few weeks, shedding dead cells and making new ones. Thyroid hormone drives that turnover. Without enough hormone, old dead cells pile up on the surface and sweat glands (eccrine glands) produce less moisture, so your skin gets thick, dry, and scaly—especially on elbows, knees, and shins.
6. Your hair thins and falls out more than usual when you brush or wash it. — Each hair follicle cycles between a growing phase (anagen), a resting phase (telogen), and a shedding phase. Thyroid hormone keeps follicles in the growing phase. When hormone drops, more follicles shift into resting and shedding, so you lose hair faster than it regrows. The outer third of your eyebrows may thin or disappear completely—a classic sign doctors look for.
7. If you have periods, they become heavier, longer, or more irregular; you may soak through pads or have cycles every few weeks instead of monthly. — Thyroid hormone works with estrogen and progesterone to control the menstrual cycle. Low thyroid disrupts the hypothalamic-pituitary-ovarian axis, so ovulation may not happen (anovulation), progesterone drops, and the uterine lining sheds unpredictably. Periods become heavy (menorrhagia) or come too often. Fertility also drops because eggs do not mature properly.
8. Your face, hands, and ankles swell and look puffy; you may leave a dent when you press your shin, but the dent fills in slowly. — Low thyroid hormone causes your tissues to fill with a thick gel-like substance made of glycosaminoglycans and protein—this is called myxedema. It is not regular water swelling (pitting swelling (edema)); it is a non-pitting puffiness that makes your face look doughy, your eyelids swollen, and your tongue thick. Fluid also leaks into body cavities, causing pericardial a fluid collection (effusion) (fluid around the heart) or pleural a fluid collection (fluid around the lungs).

9. You feel sad, your mood sinks, and your thinking feels slow and foggy—doctors may mistake this for depression. — Thyroid hormone helps your brain make and use neurotransmitters like serotonin (which steadies mood) and norepinephrine (which keeps you alert). Low hormone also slows blood flow and glucose delivery to the prefrontal cortex (the front of the brain that handles planning and emotion regulation), so you feel depressed, unmotivated, and mentally sluggish. Treating the thyroid often lifts the mood without needing antidepressants.

Symptoms · what the patient feels, and why

- Tired all the time, even after sleeping: The immune system attacks the thyroid gland (the neck gland that sets the body's speed), so it can't make enough thyroid hormone to keep your cells running at normal speed — like a battery running low, everything slows down.
- Weight gain without eating more: Low thyroid hormone slows your metabolism (how fast your body burns food for energy), so you store more calories as fat even if you haven't changed what you eat.
- Feeling cold when others feel fine: Thyroid hormone normally tells cells to burn fuel and make heat; when it's low, your body produces less heat, so you feel chilly even in a warm room.
- Dry skin and hair; hair falls out more: Thyroid hormone keeps skin and hair follicles healthy and growing; when it drops, skin cells don't make enough oil and hair roots slow down or stop, so skin dries out and hair thins.
- Constipation (hard to poop): Low thyroid hormone slows the muscles that push food through your gut, so waste moves more slowly and becomes hard and dry.
- Goiter (a swelling in the front of the neck): Early on, the thyroid gland swells because the pituitary gland (a tiny boss gland in the brain) sends extra TSH (thyroid-stimulating hormone) to push the thyroid to work harder; later the gland may shrink as immune cells destroy more of it.
- Trouble thinking clearly or remembering things: The brain needs thyroid hormone to work at full speed; when it's low, nerve signals slow down and brain cells can't connect as quickly, so thinking feels foggy.
- Heavy or irregular periods: Thyroid hormone helps control the signals that run the menstrual cycle; when it's low, the lining of the uterus can build up unevenly and bleeding becomes heavier or unpredictable.
- Muscle aches and joint pain: Low thyroid hormone slows repair of muscle and joint tissue; waste products build up and tissues swell slightly, causing aching and stiffness.

- Very high TSH (blood test) and low free T4: The pituitary gland senses that thyroid hormone is too low, so it pumps out extra TSH to try to wake the thyroid up; because the thyroid is damaged by the immune attack, free T4 (the active thyroid hormone in the blood) stays low despite the high TSH signal.

Focused exam

- Neck swelling (goiter) early, then shrinking later: In Hashimoto thyroiditis, the immune system attacks the thyroid, making it swell at first. Over months to years, the gland gets destroyed and shrinks. A big firm thyroid early on tells you inflammation is active; a small hard gland later tells you the gland is mostly scarred and dead.
- Slow heart rate (bradycardia, under 60 beats per minute): Thyroid hormone speeds up the heart. When Hashimoto thyroiditis destroys the thyroid, there is less hormone, so the heart slows down. This is a sign the body is running in low-energy mode.
- Dry, cold skin: Thyroid hormone controls how fast your cells burn fuel and make heat. Low thyroid from Hashimoto means less heat made, so skin gets cold and dry because sweat glands slow down and blood vessels tighten to save energy.
- Hair thin or falling out: Hair follicles grow fast and need thyroid hormone to fuel that growth. In Hashimoto thyroiditis, low hormone slows the growth cycle, so more hairs fall out than grow back.
- Puffy face and eyelids (myxedema): When Hashimoto thyroiditis makes thyroid hormone drop very low, a thick gel made of sugar chains (glycosaminoglycans) builds up under the skin. This makes the face and eyelids look swollen. Myxedema is a red flag that hypothyroidism is severe.
- Slow reflexes (delayed relaxation phase of deep tendon reflexes): Thyroid hormone speeds up how nerves fire and muscles relax. In Hashimoto thyroiditis, the muscles contract normally but take longer to relax after you tap the knee or ankle. This slow relaxation shows the hormone is very low.

Diagnostics · every test answers a question

- TSH (thyroid-stimulating hormone) → Is the pituitary gland screaming at the thyroid to work harder?
- Free T4 (thyroxine, the main thyroid hormone) → Is the thyroid actually making enough hormone, or is it broken?
- Anti-TPO antibodies (antibodies against thyroid peroxidase, the enzyme that builds thyroid hormone) → Is the immune system attacking the thyroid?
- Anti-thyroglobulin antibodies (antibodies against thyroglobulin, the storage protein for thyroid hormone) → Is there a second wave of autoimmune attack on the thyroid?

- Thyroid ultrasound → Does the thyroid look destroyed, and are there any nodules that need a biopsy?
- Free T3 (triiodothyronine, the active form of thyroid hormone) → Is the body still able to convert T4 into the turbo version, T3?

Treatment logic

- Levothyroxine (synthetic T4, the main thyroid hormone) → Replaces the thyroid hormone your destroyed gland cannot make anymore. This fixes the low T4 that is making your body run in slow-motion — energy comes back, heart rate rises, skin warms up, and thinking sharpens. Dose is usually 1.6 micrograms per kilogram of body weight per day, taken once every morning on an empty stomach.
- Check TSH and free T4 every 6–8 weeks after starting or changing the dose → Tells you if the dose is right by measuring how hard your pituitary is working to wake up your thyroid. Goal is TSH between 0.5 and 2.5 mIU/L for most people (ATA guidelines). This lets you dial in the exact amount you need — too little and you stay tired, too much and your heart races.
- Start with a lower dose (25–50 micrograms per day) in elderly patients or anyone with heart disease → Prevents your heart from getting stressed when you suddenly flood it with new hormone. A weak heart can go into a dangerous fast rhythm (like atrial fibrillation (an irregular, quivering heartbeat)) or even have a heart attack if you ramp up thyroid hormone too fast. Starting low and raising the dose every 4–6 weeks lets the heart adjust safely.
- Take levothyroxine on an empty stomach, 30–60 minutes before breakfast, with water only → Lets your gut absorb the full dose. Food, coffee, calcium pills, iron pills, and antacids all block absorption, so the dose that should work will not. Taking it alone in the morning makes sure the hormone gets into your blood.
- Screen for other autoimmune diseases (type 1 diabetes, celiac disease, vitiligo, Addison disease, pernicious anemia) → Finds other places where the immune system is attacking the body. About 10–20% of people with Hashimoto also have celiac disease, and several percent have type 1 diabetes or Addison disease (where the immune system destroys the adrenal glands). Catching these early prevents crises like severe low blood sugar or a life-threatening adrenal crash.
- Recheck thyroid function once a year after the dose is stable → Catches slow changes. As your thyroid keeps dying, you may need more levothyroxine over time. Weight changes, pregnancy, and some medicines (like estrogen pills or seizure drugs) also change how much hormone you need. Yearly TSH keeps the dose right.

Medications

Levothyroxine · Synthetic thyroid hormone (T4 replacement)

Levothyroxine is a man-made copy of thyroxine (T4), the main hormone your thyroid normally makes. When Hashimoto thyroiditis damages the thyroid so it cannot make enough hormone, levothyroxine steps in to replace what is missing. Your body converts it into the active form (T3) that every cell uses to control how fast it burns energy. This keeps your metabolism, heart rate, body temperature, and energy steady.

1. You swallow levothyroxine on an empty stomach (usually first thing in the morning) so your gut can absorb it fully.
2. The drug enters your bloodstream and travels throughout your body, carried by proteins.
3. Inside your cells, enzymes strip one iodine atom off levothyroxine (T4) to turn it into triiodothyronine (T3), the active form that does the actual work.
4. T3 enters the nucleus of each cell and attaches to thyroid hormone receptors, switching on genes that control how fast the cell uses oxygen and makes energy.
5. With normal thyroid hormone levels restored, your metabolism, heart rate, temperature, and energy return to a healthy range.
6. The pituitary gland senses the normal hormone level and stops releasing extra TSH, so the blood test shows TSH dropping back toward the normal range.

SAFETY WATCH

Start with a lower dose in older adults (usually age 65 and up), people with heart disease (angina, prior heart attack, or heart failure), and people who have had severe, long-standing hypothyroidism for years, because a sudden jump in metabolism can strain the heart. · Take levothyroxine on an empty stomach, at least 30 to 60 minutes before breakfast, and do not take it with calcium, iron, or antacids within 4 hours, because those block absorption. · Recheck TSH (the blood test that shows whether the dose is right) 6 to 8 weeks after starting or changing the dose, because it takes that long for your body to reach a steady level. · Watch for signs of too much thyroid hormone (overtreatment): fast or pounding heart, shaking hands, trouble sleeping, weight loss, nervousness, or sweating. If these appear, the dose may be too high. · Women who are pregnant need a higher dose (usually 25 to 30 percent more), so tell your doctor right away if you become pregnant, and check TSH every 4 weeks during pregnancy. · If you also have adrenal insufficiency (Addison disease), treat that FIRST before starting levothyroxine, because thyroid hormone can trigger an adrenal crisis if the adrenal glands are not supported. · Many drugs can interfere: estrogen, testosterone, seizure medicines (phenytoin, carbamazepine), and rifampin can change how much levothyroxine you need, so tell your doctor about all medicines and supplements.

Red flags

- Sudden, severe swelling in the neck that makes it hard to breathe or swallow (could mean bleeding into the thyroid or a dangerous infection)
- Heart rate under 50 or trouble staying awake, feeling very confused, or body temperature under 95°F (signs of myxedema coma, a life-threatening shutdown from very low thyroid hormone)
- A hard, fixed lump in the thyroid that doesn't move (raises concern for thyroid cancer, which is rare but needs urgent check)

Nursing priorities

1. Check vital signs including temperature and watch for a slow heart rate (bradycardia) (slow heart rate below 60) or hypothermia (body temperature below 95 degrees) — Severe hypothyroidism slows metabolism so heart rate and body temperature drop, and temperatures below 95 degrees signal possible myxedema coma requiring ICU care
2. Assess mental status and level of alertness at every shift, noting any confusion or excessive sleepiness — Progressive confusion or sleepiness means brain metabolism is slowing from severe hypothyroidism and can progress to myxedema coma where the patient stops breathing

3. Teach patient to take levothyroxine on empty stomach 30 to 60 minutes before breakfast with water only, and avoid calcium or iron supplements within 4 hours — Food blocks absorption of thyroid hormone by 40 percent, and calcium or iron bind to the medicine in the stomach preventing the body from using it
4. Monitor TSH (thyroid stimulating hormone) and free T4 (active thyroid hormone) levels 6 to 8 weeks after starting medicine or changing dose — The thyroid system adjusts slowly, taking 6 to 8 weeks to reach steady state, so testing earlier gives false results and testing later delays needed dose adjustments
5. Educate patient that thyroid replacement is lifelong and stopping medicine causes symptoms to return in 4 to 6 weeks — Hashimoto permanently destroys thyroid cells so the gland never recovers function, and stopping hormone replacement causes metabolism to crash again
6. Assess for signs of overtreatment including tremor, anxiety, palpitations (feeling your heartbeat), heat intolerance, or diarrhea — Too much levothyroxine creates hyperthyroidism which stresses the heart causing atrial fibrillation (an irregular, quivering heartbeat) (irregular heartbeat) and weakens bones causing osteoporosis (brittle bones)
7. Screen for other autoimmune conditions by asking about joint pain, rashes, belly symptoms, and checking blood sugar if not done recently — Patients with one autoimmune disease have 25 percent chance of developing another, especially celiac disease, type 1 diabetes, rheumatoid arthritis, or lupus
8. In elderly patients or those with heart disease, verify the starting dose is low (12.5 to 25 micrograms daily) and increases happen slowly every 6 to 8 weeks — Thyroid hormone increases heart rate and oxygen demand, so starting full doses in fragile patients triggers heart attack or unstable angina

Sources

- American Thyroid Association (ATA) Guidelines for Hypothyroidism 2014
- Endocrine Society Clinical Practice Guideline on Hypothyroidism 2012
- UpToDate evidence summary on Hashimoto thyroiditis
- Cochrane systematic reviews on thyroid disease

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