

# Hyperthyroidism

A plain-English guide for you and your family

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## WHAT IS HAPPENING

Normally, a tiny control tower in your brain called the pituitary sends out a signal hormone named TSH (thyroid-stimulating hormone) that travels through your blood to your thyroid gland in the front of your neck. The thyroid then makes a hormone called T4 and a small amount of T3. T4 travels to your body's tissues, where it turns into T3 (the active form that actually does the work). T3 plugs into special docking spots on your cells and tells them to speed up — it makes your heart beat faster, raises your body temperature, and burns food for energy. When enough T3 builds up, it sends a 'turn down' signal back to the pituitary so TSH drops and the thyroid makes less hormone. That feedback loop keeps everything balanced. In hyperthyroidism, that balance breaks. The most common cause is Graves disease, where your immune system makes rogue antibodies (thyroid-stimulating immunoglobulins, or TSI) that look like TSH and turn the thyroid on full blast, ignoring the normal off switch. Another cause is a toxic nodule or toxic multinodular goiter — lumps in the thyroid that pump out hormone on their own without listening to TSH. A third cause is thyroiditis (thyroid inflammation), which can be painful or silent; it cracks open thyroid cells and dumps stored hormone into your blood for a few weeks before burning out. No matter the cause, too much thyroid hormone floods your body. Your heart races because T3 makes beta receptors on heart muscle extra sensitive to adrenaline. Your skin feels warm and sweaty because blood vessels open wide to dump the extra heat. You lose weight even though you are eating more, because every cell is burning fuel faster than normal. Your bones break down faster because T3 tells bone cells to release calcium. You might feel shaky, anxious, or unable to sleep because your brain and nerves are revved up. Women may stop having periods because the hormonal balance shifts. None of this is random — every symptom traces back to one upstream break: too much thyroid hormone. Your body is not failing; it is doing exactly what too much hormone tells it to do. The danger is that if hormone levels climb even higher or if stress (infection, surgery, stopping medicine suddenly) hits, you can tip into thyroid storm — a life-threatening crisis with a fever over 104°F, heart rate above 140, confusion, and heart failure. The key is to catch hyperthyroidism early, find the cause, and turn down the thyroid before the body cannot compensate anymore.

## What you might feel

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- Fast heart rate (often over 100 beats per minute, even at rest)
- Fine shaking of the hands (tremor)
- Warm, sweaty skin
- Weight loss despite eating normally or more
- Feeling nervous, worried, or jittery
- Missed or irregular periods in women
- Bulging eyes (proptosis) and eyelid retraction (eyes look wide or staring)
- Enlarged, smooth thyroid gland (goiter) that you can feel in the neck
- Painful, tender thyroid gland (in subacute thyroiditis)
- Confusion, fever over 104°F, or very fast heart rate (over 140) at rest

## Call the doctor right away if...

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- 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)

## What the care team will do

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- Monitor heart rate and rhythm every 2 to 4 hours and report rate above 120 or new irregularity immediately
- Check temperature every 4 hours and notify provider if it rises above 100.4°F
- Administer beta-blocker medication as prescribed and hold if heart rate is below 60 or systolic blood pressure is below 100
- Give methimazole or PTU at the same time every day and teach patient never to stop suddenly without provider guidance
- Provide a cool, quiet, low-stimulation environment and offer frequent small high-calorie meals
- Assess eyes for redness, dryness, and ability to close lids completely; provide lubricating eye drops if lids do not close fully
- Monitor for signs of agranulocytosis (severe white blood cell drop): fever, sore throat, mouth sores, or infection; hold anti-thyroid drug and notify provider immediately if these appear

- Teach patient to avoid iodine-rich foods like kelp and seaweed, and to tell all providers about thyroid diagnosis before any imaging with contrast dye

## Medicines you may be given — and why

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### Propranolol or atenolol (beta-blockers)

These drugs block the body's response to too much thyroid hormone, especially in the heart and nerves. They slow the racing heart, stop the shaking, and ease the sweaty, panicky feelings. They do NOT lower thyroid hormone itself—they just turn down the alarm bells while the real treatment works.

### Methimazole

Methimazole blocks the thyroid gland from making new thyroid hormone. It stops an enzyme (thyroid peroxidase) that glues iodine onto thyroglobulin—the step that builds T3 and T4. The gland keeps running, but it can't make hormone, so levels in the blood drop over weeks.

### Propylthiouracil (PTU)

PTU works like methimazole—it blocks thyroid peroxidase so the gland can't make new thyroid hormone. PTU also blocks the enzyme (deiodinase) that converts T4 into T3 (the stronger form) in the liver and other tissues, so it lowers active hormone a bit faster. It is used in the first trimester of pregnancy and in thyroid storm because of that extra effect.

### Radioactive iodine-131 (RAI)

You swallow a capsule or liquid containing radioactive iodine. The thyroid gland soaks up iodine to make hormone, so it pulls in the radioactive version. The radiation destroys the overactive thyroid cells from the inside. Over 2–3 months, the gland shrinks and hormone levels drop—usually all the way to low (hypothyroidism), which you then treat with thyroid hormone pills for life.

### Thyroid surgery (thyroidectomy)

A surgeon removes most or all of the thyroid gland. With the gland gone, thyroid hormone production stops. This is permanent and works immediately (once you're healed). You will need thyroid hormone pills (levothyroxine) for life afterward. Surgery is chosen when the gland is very large (causing trouble swallowing or breathing), when there are suspicious nodules that might be cancer, when eye disease is severe, or when the patient prefers surgery over radioactive iodine.

## **NSAIDs (ibuprofen, naproxen) or aspirin for thyroiditis**

In subacute (painful) thyroiditis, the thyroid gland is inflamed and tender—often after a viral infection. NSAIDs block the enzyme cyclooxygenase (COX), which makes prostaglandins that cause pain, fever, and swelling. Lowering prostaglandins eases the neck pain and fever. The thyroid will heal on its own in weeks to months; NSAIDs just make you comfortable while you wait.

## **Prednisone (corticosteroid, for severe thyroiditis pain)**

Prednisone is a powerful anti-inflammatory. It turns down the immune system and blocks many inflammation signals at once. In subacute thyroiditis, when the gland is very swollen and painful and NSAIDs are not enough, a short course of prednisone (2–4 weeks, tapered down) quickly eases pain and shrinks the swelling. It does NOT lower thyroid hormone; it just calms the inflammation.

## **Levothyroxine (for the hypothyroid phase after thyroiditis or RAI/surgery)**

Levothyroxine is a pill form of T4 (the main thyroid hormone). After radioactive iodine, surgery, or the late phase of thyroiditis, your thyroid gland can't make enough hormone on its own. Taking levothyroxine every morning replaces what's missing. Your body converts T4 into T3 (the active form) as needed, so one daily pill keeps your metabolism, heart, and brain running normally.

## **Where this information comes from**

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- American Thyroid Association 2016 Hyperthyroidism Guideline
- Endocrine Society Clinical Practice Guideline 2011 (updated review 2016)
- UpToDate Clinical Reference (Thyrotoxicosis)
- NEJM Clinical Practice Review on Hyperthyroidism

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