

Hypocalcemia and Hypercalcemia

A plain-English guide for you and your family

WHAT IS HAPPENING

Your body keeps calcium in a tight range because every nerve signal and muscle squeeze depends on it. Two main controllers do this job: parathyroid hormone (PTH, made by four tiny glands behind your thyroid) and vitamin D (which you get from sun and food, then your kidneys activate). PTH pulls calcium out of bone and tells kidneys to hold onto it; vitamin D helps your gut soak up calcium from food. When calcium drops too low (hypocalcemia), it's usually because the parathyroid glands were damaged during neck surgery, they're naturally weak, you don't have enough vitamin D, your magnesium is too low (magnesium is needed to release PTH), your pancreas is swollen and trapping calcium, or a severe infection is throwing everything off. When calcium climbs too high (hypercalcemia), it's usually an overactive parathyroid gland pumping out too much PTH, cancer releasing calcium from bone or making a PTH-like protein (PTHrP), diseases like sarcoidosis making extra vitamin D, vitamin D poisoning from mega-dose supplements, or being stuck in bed so long that bone releases calcium. Low calcium makes muscles and nerves jumpy—you might get tingling around your mouth, muscle cramps, twitching when the doctor taps your cheek (Chvostek sign), hand spasms when a blood-pressure cuff stays inflated (Trousseau sign), seizures, a dangerously long heartbeat on the monitor (long QT), or even your voice box clamping shut (laryngospasm). High calcium does the opposite: it makes everything sluggish—you pee constantly and get dehydrated, feel confused or drowsy, get constipated, form kidney stones, and your bones ache. None of this is random. Every symptom traces back to broken calcium control. Fix the upstream cause—replace the missing vitamin D, give back magnesium, calm the overactive parathyroid, treat the cancer—and the whole cascade stops.

What you might feel

- Muscle cramps and twitching (tetany)
- Tingling or numbness around the mouth, fingers, and toes (paresthesias)
- Chvostek sign (face twitches when you tap the cheek)
- Trousseau sign (hand cramps when a blood pressure cuff is inflated)
- Seizures

- Long QT interval on ECG (heart rhythm change)
- Confusion or memory trouble
- Weak, brittle bones or bone pain (in chronic low calcium (hypocalcemia))
- Extreme thirst, frequent urination, and kidney stones (hypercalcemia)
- Severe confusion, extreme weakness, or coma (hypercalcemic crisis)

Call the doctor right away if...

- Seizure or severe muscle spasms that won't stop
- Chest pain, fast heartbeat, or fainting (signs the heart rhythm may be dangerous)
- Severe confusion, trouble waking up, or coma
- Very high calcium (above 14 mg/dL) or very low calcium (below 7 mg/dL with symptoms)
- Sudden severe belly pain, vomiting, or signs of pancreatitis (which high calcium can trigger)

What the care team will do

- Place patient on continuous cardiac monitor and watch for prolonged QT interval on ECG (electrocardiogram, the heart tracing)
- Check Chvostek sign (tap the facial nerve in front of the ear) and Trousseau sign (inflate blood pressure cuff above systolic pressure for 3 minutes and watch for hand spasm)
- Keep IV calcium gluconate 1 to 2 grams at the bedside and ensure a patent large-bore IV line is in place
- Draw blood for ionized calcium, albumin, magnesium, phosphorus, PTH (parathyroid hormone), and vitamin D levels before giving treatment
- Administer IV calcium gluconate slowly over 10 to 20 minutes through a large vein and never push it fast
- Replace magnesium sulfate 1 to 2 grams IV over 15 minutes if serum magnesium is below 1.8 mg/dL
- For high calcium above 14 mg/dL, give normal saline IV at 200 to 300 mL per hour and monitor urine output closely
- Encourage mobilization and weight-bearing activity as soon as safe, and avoid bed rest

Medicines you may be given — and why

Calcium gluconate (IV)

Gives the body calcium directly through a vein when the blood level has dropped so low that nerves and muscles are starting to misfire — think shaking, spasms, or a heart that skips beats. It is the fastest way to boost calcium and calm those electrical signals so the heart can beat steadily and muscles can relax.

Calcium carbonate or calcium citrate (oral)

Gives the body calcium through pills taken by mouth when the low calcium is mild or the person is recovering and just needs a steady daily refill. The gut absorbs the calcium, and the blood level climbs slowly over hours and days.

Calcitriol (active vitamin D)

Turns on the body's calcium-absorbing machinery in the gut and tells the kidneys to hold onto calcium instead of peeing it out. Calcitriol is the final, ready-to-work form of vitamin D — the form that actually flips the switches in cells.

Magnesium sulfate (IV) or magnesium oxide (oral)

Refills the body's magnesium tank. Magnesium is needed for the parathyroid glands (four tiny glands in the neck) to release parathyroid hormone (PTH), and PTH is what tells bones and kidneys to keep blood calcium normal. Without magnesium, the parathyroid glands go silent, calcium drops, and replacing calcium alone will not fix it — you must replace magnesium first.

Normal saline (IV fluids)

Floods the bloodstream with salt water to dilute the calcium and flush extra calcium out through the kidneys in urine. High calcium makes people urinate a lot, which leads to dehydration, and dehydration makes calcium climb even higher — IV fluids break that cycle.

Calcitonin (injection)

Tells bone cells to stop releasing calcium into the blood and tells the kidneys to dump more calcium into urine. Calcitonin is a natural hormone made by the thyroid gland; the drug version is a synthetic copy. It works within hours — the fastest non-IV option for high calcium.

Zoledronic acid (IV bisphosphonate)

Sticks to bone and poisons the osteoclasts (the cells that chew up bone and release calcium). This stops bones from dumping calcium into the blood. It works slowly but lasts weeks — the workhorse for cancer-related high calcium.

Denosumab (injection)

Blocks RANKL, a protein signal that tells baby bone cells to grow up into osteoclasts (the bone-dissolving cells). Without that signal, fewer osteoclasts form, bone breakdown slows, and less calcium spills into the blood. It works faster than bisphosphonates and does not depend on the kidneys.

Prednisone or hydrocortisone (corticosteroid)

Blocks the gut from absorbing calcium and stops certain white blood cells (like those in lymphoma or sarcoidosis) from making too much active vitamin D. High vitamin D forces the gut to soak up calcium like a sponge; steroids slam the brakes on that process.

Hemodialysis (for life-threatening high calcium)

Runs the blood through a machine that acts as an artificial kidney, pulling calcium (and other waste) out of the blood directly and dumping it into dialysis fluid. This is the fastest way to drop calcium when it is so high that the heart or brain is in immediate danger and drugs are too slow.

Where this information comes from

- Endocrine Society Clinical Practice Guideline 2016
- UpToDate Clinical Reference (Endocrinology)
- American Association of Clinical Endocrinology
- NEJM Clinical Practice

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