

Myxedema Coma

Myxedema coma is when severe low thyroid crashes the body — almost every system slows to a crawl and the patient can die.

THE ONE-LINE TRUTH

The thyroid has stopped working, and the patient's whole body is shutting down.

The chain — how it unfolds

1. Core temperature drops below 95°F (35°C) — why: Thyroid hormone (T3) tells the mitochondria (the cell's power plants) to burn fuel and make heat. Without enough T3, fuel burning slows way down, heat production falls, and the body loses more heat than it makes — so core temperature drops.
2. Heart rate slows and the heart pumps weakly — why: The sinoatrial node (the heart's natural pacemaker in the right atrium) depends on thyroid hormone to fire at a normal speed. Low T3 slows the pacemaker, so heart rate falls into the 40s or 50s. At the same time, thyroid hormone normally strengthens heart muscle contraction, so without it the heart pumps weakly and cardiac output (how much blood the heart pushes out) drops.
3. Breathing drive falls and carbon dioxide builds up — why: The medulla (the part of the brainstem that controls breathing) has a breathing center that depends on thyroid hormone to stay alert and responsive. Low T3 dulls this center, so the urge to breathe drops, breaths become slow and shallow, and carbon dioxide (CO₂) builds up in the blood, causing respiratory acidosis (acid building up from trapped carbon dioxide).
4. Thinking becomes foggy, then the patient slips into confusion or coma — why: The brain needs steady blood flow carrying oxygen and glucose to work. When the heart pumps weakly, less blood reaches the brain. At the same time, thyroid hormone is essential for normal brain cell (neuron) metabolism and neurotransmitter function. Without enough T3, neurons slow down, thinking gets muddy, and the patient becomes confused, stuporous, or unconscious (comatose).
5. Sodium in the blood falls (hyponatremia) — why: Low thyroid hormone causes myxedema — swelling of cells because they fill with sugar-protein chains (glycosaminoglycans) that trap water. This pulls sodium out of the bloodstream and into the swollen cells. At the same time, the kidneys work slowly and cannot clear free water or correct sodium levels fast enough, so serum sodium drops.

6. Blood pressure falls and does not respond to IV fluids — why: The adrenal glands often fail at the same time (adrenal insufficiency), so cortisol levels are too low. Cortisol normally helps blood vessels tighten and keeps blood pressure stable during stress. Without it, blood vessels stay loose, blood pressure drops, and giving IV fluids does not fix the problem.
7. Blood sugar can drop dangerously low (hypoglycemia) — why: Thyroid hormone and cortisol both help the body make new glucose (gluconeogenesis) and release stored glucose from the liver. When both are low, the body cannot keep blood sugar steady, so glucose falls and the brain (which runs on glucose) is starved.
8. The patient is at the edge of collapse — every system is failing together — why: Each finding — hypothermia, slow weak heart, shallow breathing with rising CO₂, confusion or coma, low sodium, low blood pressure, low blood sugar — traces back to the same broken part: not enough thyroid hormone (and often not enough cortisol). This is the body shutting down, not compensating. Treatment must start immediately with IV levothyroxine (T₄) and IV hydrocortisone (cortisol replacement) to restart the body's systems before the patient dies.

Spot it — what you see, and why

- Very low body temperature (often below 95°F): Without enough thyroid hormone (the body's metabolism gas pedal), every cell in the body slows down and makes less heat, so body temperature drops dangerously low.
- Extremely slow or confused thinking, sometimes completely unresponsive: The brain needs thyroid hormone to keep neurons firing quickly; when levels crash, the brain fog deepens into true confusion, lethargy, and eventually coma.
- Very slow heart rate and low blood pressure: Thyroid hormone tells the heart how fast to beat; without it, the heart slows way down and pumps weakly, so blood pressure falls.
- Breathing is slow and shallow: The muscles that control breathing lose their drive when thyroid hormone is missing, so breaths become slow and weak; carbon dioxide can build up dangerously in the blood.
- Skin looks puffy, thick, and smooth, especially around the eyes and hands: Without thyroid hormone, the body's tissues pile up a thick gel called mucopolysaccharides (like sticky glue under the skin), which traps water and makes everything look swollen.
- Hair is dry, coarse, and brittle; outer third of eyebrows may be thin or missing: Thyroid hormone keeps hair follicles cycling and healthy; when it drops, hair grows slowly, becomes rough, and can fall out, especially at the outer edge of the eyebrows.

Red flags — act now

- Body temperature below 95°F (hypothermia)

- Breathing becomes very slow or stops (respiratory failure)
- Completely unresponsive or unable to wake up (coma)
- Heart rate under 50 beats per minute with dangerously low blood pressure (shock)
- Recent infection, surgery, cold exposure, or suddenly stopped taking thyroid medicine

Treat it — in this order

1. Give IV hydrocortisone 100 mg immediately, then 50-100 mg every 6-8 hours → About half of myxedema coma patients also have adrenal glands that cannot make cortisol (the body's main stress hormone). Cortisol keeps blood pressure up and helps the heart respond to stress. Replacing it prevents shock and death while you wait for thyroid hormone to work.
2. Give IV levothyroxine (T4) 200-400 mcg loading dose, then 50-100 mcg IV daily until the patient can swallow pills → Levothyroxine is synthetic thyroid hormone (T4). It tells every cell in the body to restart its furnace, burn fuel, make heat, wake the brain, and speed the heart. It reverses the root cause of myxedema coma. Effects begin in 6-12 hours and build over several days.
3. Some centers add IV liothyronine (T3) 5-20 mcg loading dose, then 2.5-10 mcg every 8 hours for 1-2 days → Liothyronine is the active form of thyroid hormone (T3) and works faster than levothyroxine (within 4-6 hours). It may help speed recovery in very sick patients. Guidelines vary — some experts use it, others do not because it can stress the weak heart.
4. Passive rewarming with blankets; do NOT use heating blankets, warm IV fluids, or forced-air warmers → Passive warming (room-temperature blankets, warm room air) lets body temperature rise slowly and safely. The heart in myxedema coma is weak and cannot handle sudden heat, which can cause dangerous arrhythmias or shock.
5. Give IV normal saline or hypertonic saline (3%) slowly if sodium is very low; raise sodium no faster than 6-8 mEq/L in 24 hours → Myxedema coma causes the kidneys to hold water and dilute blood sodium. Low sodium (especially < 120 mEq/L) causes confusion, seizures, and coma. Slow, careful correction fixes the balance without causing osmotic demyelination syndrome (brain damage from sodium rising too fast).

Your top priorities at the bedside

1. Check core body temperature with a low-reading thermometer that goes below 94 degrees Fahrenheit, and recheck every 2 hours — why: Regular thermometers do not read below 94 degrees, so you will miss dangerous hypothermia (very low body temperature below 95 degrees); low body temperature below 90 degrees means the patient is critically ill and may die without treatment.

2. Start passive rewarming with warm blankets and raise room temperature, but never use heating blankets, hot water, or warming devices directly on the skin — why: Active external heating (using heating devices) causes blood vessels in the skin to open wide and pulls blood away from the heart and brain, which drops blood pressure and can cause cardiac arrest (heart stops); passive warming is safer.
3. Monitor respirations every hour and watch for slow breathing rate below 10 breaths per minute or shallow breathing — why: Myxedema coma slows the breathing center in the brain and weakens breathing muscles, causing carbon dioxide (a waste gas) to build up in the blood; high carbon dioxide causes more confusion and can stop breathing completely, requiring a breathing tube.