

Rhabdomyolysis

A plain-English guide for you and your family

WHAT IS HAPPENING

Your muscles are wrapped in a thin skin called the sarcolemma that keeps everything inside the cell where it belongs. Normally, if a tiny bit of myoglobin (the protein that carries oxygen in muscle) leaks out, your kidneys can filter it and get rid of it safely. But when a lot of muscle breaks down all at once — from a crush injury, being stuck in one position too long, a seizure, extreme exercise, certain medicines like statins, alcohol, street drugs like cocaine or heroin, severe heat or cold, an electrolyte imbalance, or compartment syndrome (when pressure builds up and chokes off blood flow inside a muscle) — the sarcolemma tears open and the muscle dumps huge amounts of myoglobin, potassium, phosphate, calcium, and enzymes into your blood. You will feel muscle pain, swelling, and weakness where the damage happened. Your urine turns dark, like cola or tea, because myoglobin is pouring through your kidneys. Blood tests show sky-high CK (creatinine kinase, a muscle enzyme), high potassium (hyperkalemia), high phosphate (hyperphosphatemia), low calcium (hypocalcemia, because calcium gets trapped inside the dying muscle), and acids building up in the blood (metabolic too much acid in the blood (acidosis)). The real danger is that myoglobin clogs the tiny filters in your kidneys like sludge in a pipe, especially when urine is acidic and flow is low, causing acute kidney injury. The body is not trying to hurt itself — it is trying to survive. High potassium is the cost of keeping cells alive, too much acid in the blood is a sign cells are screaming for oxygen, and low calcium is the body's attempt to keep calcium from rushing back into damaged muscle and making things worse. When you see muscle pain, dark urine, and these lab changes, trace it back to one broken thing: the sarcolemma failed because of a specific cause. Fix that cause, flood the body with IV fluids to flush the kidneys, correct the electrolytes carefully, and support the kidneys until the muscle stops leaking and healing can begin.

What you might feel

- Muscle pain and tenderness (myalgia)
- Muscle weakness
- Dark tea-colored or cola-colored urine

- Swollen, firm muscles
- Nausea and vomiting
- Confusion or agitation
- Decreased urine output or no urine at all
- Fever

Call the doctor right away if...

- Dark or tea-colored urine (sign that myoglobin is spilling into the urine and may be damaging the kidneys)
- Little or no urine output (sign the kidneys are failing)
- Severe muscle pain, swelling, or weakness that keeps getting worse (risk of compartment syndrome — pressure building up so high it cuts off blood flow)
- Confusion, irregular heartbeat, or chest pain (sign that potassium or calcium is dangerously out of balance and threatening the heart)
- History of a major trigger: crush injury, prolonged immobilization, seizures, extreme exercise, heat stroke, or certain drugs (statins, cocaine, amphetamines)

What the care team will do

- Start two large-bore IV lines and infuse normal saline or lactated Ringer solution at 1.5 liters per hour, then adjust the rate to keep urine output between 200 and 300 milliliters every hour.
- Place a Foley catheter and measure urine output every hour; observe and document the color of the urine.
- Draw blood immediately for CK (creatinine kinase, a muscle enzyme), potassium, creatinine (kidney function marker), calcium, phosphate, and check a baseline EKG for peaked T waves or wide QRS complexes.
- Monitor continuous telemetry and watch for peaked T waves, widened QRS, or arrhythmias; have calcium gluconate 1 gram IV and insulin with dextrose at the bedside ready to give immediately.
- Perform neurovascular checks every 2 hours on all limbs: assess pulses, capillary refill, sensation, movement, and measure compartment firmness; notify the physician immediately if pain is out of proportion to exam or if pulses weaken.
- Track daily weights, strict intake and output totals, and watch for signs of fluid overload such as crackles in the lungs, shortness of breath, or jugular vein distension.

- Hold all nephrotoxic drugs (NSAIDs like ibuprofen, ACE inhibitors, aminoglycoside antibiotics) and statins; review the medication list with the provider and confirm nothing is making the rhabdomyolysis worse.
- Prepare for urgent hemodialysis or continuous renal replacement therapy if potassium stays above 6.5 milliequivalents per liter despite treatment, creatinine keeps rising, urine output drops below 0.5 milliliters per kilogram per hour for 6 hours, or the patient becomes volume overloaded.

Medicines you may be given — and why

Normal saline or lactated Ringer's solution (IV fluids)

Water with salt (or water with salt and a tiny bit of lactate) pumped directly into a vein to flood the kidneys with extra liquid so they can flush out the muscle protein (myoglobin) before it clogs the kidney filters and causes kidney failure.

Insulin (regular) plus glucose (dextrose)

Insulin (the hormone that opens the door for sugar to enter cells) is given along with sugar (glucose) to push potassium from the blood back inside muscle and other cells, temporarily lowering dangerously high blood potassium that can stop the heart.

Calcium gluconate or calcium chloride (IV)

Calcium (a mineral that helps the heart's electrical system fire correctly) is given by IV to immediately protect the heart muscle from the dangerous effects of high potassium, which can stop the heartbeat – calcium does NOT lower potassium, it just shields the heart while other treatments bring potassium down.

Sodium bicarbonate (IV)

Baking soda given by IV to make the blood and urine more alkaline (less acidic), which in theory keeps myoglobin (the muscle protein clogging the kidneys) dissolved and prevents it from crystallizing in the kidney tubes – however, recent evidence shows NO clear benefit, and many hospitals no longer use it routinely for rhabdomyolysis.

Mannitol (IV)

A sugar-alcohol that pulls extra water from body tissues into the bloodstream and then forces the kidneys to make more urine, flushing out myoglobin and reducing swelling inside muscle compartments – used in some centers but NOT universally recommended because evidence of benefit is weak.

Hemodialysis (renal replacement therapy)

A machine that takes blood out of the body, runs it past a filter (dialyzer) that removes waste, extra potassium, acid, and fluid, and then returns the cleaned blood – used when the kidneys have failed and cannot clear the flood of muscle breakdown products, or when potassium or fluid overload is life-threatening.

Albuterol (nebulized)

A rescue inhaler medicine (usually used for asthma) that activates beta-2 receptors on cell membranes, turning on pumps that push potassium from the blood back into cells – used as a temporary emergency measure to lower dangerously high potassium.

Sodium polystyrene sulfonate (Kayexalate) or patiromer (Veltassa) or sodium zirconium cyclosilicate (Lokelma)

Powders or liquids given by mouth or rectum that bind potassium in the intestines and carry it out in the stool, slowly lowering blood potassium over hours to days – NOT used for emergency potassium lowering (too slow), but sometimes used after the crisis to prevent potassium from climbing again.

Pain control (acetaminophen, opioids as needed)

Medicines to reduce severe muscle pain from rhabdomyolysis – acetaminophen (Tylenol) blocks pain signals in the brain, and opioids (morphine, fentanyl) bind to opioid receptors in the brain and spinal cord to dull pain perception – important for comfort but do NOT treat the muscle breakdown itself.

Where this information comes from

- UpToDate Clinical Guidelines on Rhabdomyolysis
- American College of Physicians (ACP) Clinical Practice
- National Kidney Foundation (NKF) Acute Kidney Injury Guidelines
- Cochrane Reviews on Muscle Injury and Acute Renal Failure

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