CONDITION

Rhabdomyolysis

Rhabdomyolysis is rapid muscle breakdown that releases substances capable of damaging the kidneys and disrupting body chemistry.

WHAT IT IS
Rapid breakdown of skeletal muscle fibres

BODY SYSTEM
Muscles, kidneys, and body chemistry

MAIN SYMPTOMS
Muscle pain, weakness, swelling, dark urine

WHAT CAUSES IT
Exertion, injury, heat, medicines, toxins, or illness

HOW IT IS DIAGNOSED
Blood creatine kinase, kidney, and electrolyte tests

MAIN TREATMENT
Intravenous fluids and treatment of the trigger

CAN IT BE CURED?
Yes - most treated episodes fully resolve

IS IT AN EMERGENCY?
Yes - suspected cases need prompt assessment

LONG-TERM OUTLOOK
Most recover; severe kidney damage may persist

Overview

Rhabdomyolysis, often shortened to "rhabdo," is a condition in which skeletal muscle cells break down quickly. Skeletal muscles are the muscles used for movement.

Damaged muscle releases proteins and minerals into the blood. One of these proteins, myoglobin, can contribute to kidney injury. Released minerals can also disturb the electrical activity of the heart.

Rhabdomyolysis ranges from a mild laboratory finding to a serious medical emergency. The severity cannot be judged from muscle soreness alone. Some people have severe muscle pain and no kidney damage, while others have few muscle symptoms but important changes in their blood tests.

Prompt assessment matters because early treatment can protect the kidneys and correct dangerous changes in body chemistry.

Symptoms

Symptoms may begin within hours of an injury or intense activity, but they can also develop over a day or two. Not everyone has the classic combination of muscle pain, weakness, and dark urine.

Possible symptoms include:

The thighs, calves, shoulders, and lower back are common areas of pain, although any skeletal muscle can be affected.

Dark urine comes from myoglobin released by damaged muscle. However, urine may remain a normal colour, so clear or yellow urine does not rule out rhabdomyolysis. Dark urine can also have other causes, including blood in the urine, liver problems, or severe dehydration.

Ordinary muscle soreness after exercise is common. Pain that is unusually severe, continues to worsen, causes marked swelling or weakness, or comes with dark urine needs prompt medical assessment.

- Muscle pain, tenderness, stiffness, or cramps
- Muscle weakness or difficulty moving normally
- Swelling of the affected muscles
- Dark red, brown, or tea-coloured urine
- Passing less urine than usual
- Nausea, vomiting, tiredness, or feeling generally unwell

Causes and risk factors

Rhabdomyolysis happens when muscle cells are damaged faster than the body can manage the substances they release.

Physical causes include crush injuries, major falls, burns, electric shock, long operations, and lying in one position for many hours. Seizures can also damage muscles because they cause forceful, repeated contractions.

Intense physical activity is another cause. Exertional rhabdomyolysis is more likely after activity that is unfamiliar, prolonged, or especially demanding. It can happen to well-trained

athletes as well as people starting a new exercise programme. Exercising in high heat can increase the risk.

Other possible triggers include:

Statins like atorvastatin or simvastatin , which lower cholesterol, can rarely contribute to serious muscle breakdown. Risk may be higher with certain medicine combinations or underlying health problems. Most people taking statins do not develop rhabdomyolysis. Do not stop a prescribed medicine solely because of ordinary muscle aches; contact the prescriber for advice.

Some people have an inherited problem with how their muscles use energy. This may be considered when episodes keep returning, occur after modest activity, happen during fasting or illness, or are linked to a family history of similar problems.

Often, more than one factor is involved. For example, strenuous activity, heat, dehydration, and a medicine may act together.

- Heat illness or very high body temperature
- Serious infections
- Severe fluid loss
- Alcohol, cocaine, amphetamines, and some other substances
- Certain prescribed medicines
- Major disturbances in blood salts or hormones
- Inflammatory or inherited muscle conditions

Diagnosis

Rhabdomyolysis is confirmed mainly with a blood test for creatine kinase, or CK. CK is an enzyme stored inside muscle cells. Its level rises when muscle is damaged.

Clinicians often use a CK level several times above the laboratory's normal upper limit as evidence of rhabdomyolysis. There is no single CK number that predicts exactly who will develop complications.

Other blood tests check:

A urine test may react as if blood is present even when few or no red blood cells are seen under a microscope. This can suggest myoglobin in the urine, but the finding is not reliable enough to confirm or exclude rhabdomyolysis by itself.

An electrocardiogram, or ECG, may be needed if potassium or other body salts are abnormal.

An ECG records the heart's electrical activity.

Further tests depend on the likely trigger. Imaging may be used after an injury or when severe swelling raises concern about pressure inside a muscle compartment. Repeated or unexplained episodes may lead to specialist testing for an inherited or inflammatory muscle condition.

- Kidney function, including creatinine
- Potassium, calcium, phosphate, and other body salts
- Acid levels and hydration
- Possible infection or another suspected cause

Treatment and management

Treatment depends on the amount of muscle damage, the cause, kidney function, and changes in body salts. Many people with significant rhabdomyolysis are treated in hospital.

Intravenous fluids are the main treatment. These fluids enter a vein and help maintain circulation and urine production while the kidneys clear waste. The amount must be adjusted carefully, especially in people with heart or kidney conditions.

The trigger also needs attention. This may involve cooling someone with heat illness, treating an infection, managing an injury, or reviewing a possible medicine reaction. A prescribed medicine should only be stopped or changed with appropriate medical guidance unless emergency clinicians advise otherwise.

Blood tests and urine output are monitored because CK and electrolyte levels can change after the first assessment. Treatment may also be needed for abnormal potassium, calcium, or acid levels.

Dialysis may be required if severe kidney injury causes dangerous potassium levels, excess fluid, severe acid build-up, or other complications. Dialysis filters the blood when the kidneys cannot do so adequately. It is not routinely used simply to remove myoglobin.

Severe pressure within a swollen muscle can require urgent surgery. This complication is called compartment syndrome.

Rest may be appropriate while muscles recover, but return to work, sport, or heavy exercise should be gradual. The timing is based on the cause, symptoms, kidney function, and follow-up test results rather than a fixed number of days.

Complications

The main complication is acute kidney injury, meaning the kidneys suddenly lose some ability to filter the blood. Kidney injury may be mild and temporary, but severe cases can require dialysis.

Muscle breakdown can release large amounts of potassium. A very high potassium level can interfere with the heartbeat. Calcium and phosphate levels may also shift during the illness and recovery.

Other possible complications include:

The CK level helps show the amount of muscle injury, but it is not the only measure of risk. Kidney function, urine output, body salts, underlying health, and the cause all matter.

- Compartment syndrome from pressure inside swollen muscle
- Abnormal heart rhythms
- Fluid overload during severe kidney injury
- Widespread problems with blood clotting in very severe cases
- Lasting weakness or reduced kidney function after a severe episode

Prevention

Not every episode can be prevented. Accidents, infections, seizures, and unexpected medicine reactions may occur without warning. Inherited muscle conditions cannot be prevented, although identifying them can help reduce future triggers.

For exercise-related risk, increase the duration and intensity of activity gradually. Take extra care when returning after illness, injury, or a long break. Avoid suddenly repeating a large number of unfamiliar movements.

During work or exercise in hot conditions, use planned rest periods, lighter workloads where possible, and time to adapt to the heat. Drink according to conditions and thirst. Drinking extreme amounts of plain water can also disturb body salts, so more is not always better.

Avoid continuing exercise through severe muscle pain, unusual weakness, or marked swelling. Seek assessment rather than trying to "work through" these symptoms.

Tell a healthcare professional about all medicines, supplements, alcohol use, and recreational substances if muscle symptoms develop. Do not change an essential prescribed medicine without advice.

After a previous episode, prevention should focus on the identified cause. Recurrent or

unexplained episodes may need specialist investigation before a return to intense activity.

Living with it and what to expect

Rhabdomyolysis is usually an acute condition rather than a lifelong one. Once muscle injury stops, CK levels generally fall over the following days. Pain, swelling, weakness, and urine colour often improve as the muscles and kidneys recover.

A mild episode treated early may settle without lasting effects. Recovery from extensive muscle damage can take weeks, and tiredness or weakness may continue after blood tests begin to improve.

Acute kidney injury can recover over days to weeks. More severe kidney damage may take months to improve, and some people need temporary dialysis. Lasting kidney impairment is possible after a severe episode, but it does not happen to everyone.

Follow-up commonly includes repeat CK, kidney function, and electrolyte tests. Routine follow-up is also a chance to review the trigger and plan a safe return to exercise or work.

A single episode caused by an unusual event may never return. Repeated episodes are more likely when an underlying muscle condition, medicine interaction, or recurring exposure has not been identified. In that situation, longer-term specialist follow-up may be useful.

When to get medical help

Seek urgent same-day assessment if you develop dark brown or tea-coloured urine, unusual muscle weakness, severe muscle pain, or marked swelling after strenuous activity, heat exposure, prolonged immobility, a seizure, an injury, or a new medicine.

Go to an emergency department or call emergency services if these symptoms occur with:

Do not wait for dark urine before seeking help. Rhabdomyolysis can be present without it.

For routine follow-up after treatment, attend planned blood tests and discuss any ongoing weakness, reduced urine output, repeated muscle symptoms, or difficulty returning to normal activity.

- Very little or no urine
- Fainting, confusion, or extreme drowsiness
- Chest pain, severe breathlessness, or a racing or irregular heartbeat
- Rapidly increasing swelling or severe pain in a limb

- A major crush injury, electric shock, severe burn, or heat illness
- Inability to keep fluids down or signs of severe illness

Common questions

Is rhabdomyolysis just severe muscle soreness?

No. Exercise soreness affects muscle tissue but usually does not cause the degree of cell breakdown seen in rhabdomyolysis. Severe or worsening pain, marked swelling, weakness, dark urine, or reduced urine output needs assessment.

Can I have rhabdomyolysis without dark urine?

Yes. Many people do not develop visibly dark urine. Blood tests, especially the CK level, are needed to confirm the condition.

How long does rhabdomyolysis last?

Muscle injury and CK levels often improve over days once the trigger has stopped. Physical recovery may take several weeks after a significant episode. Kidney injury can extend the recovery period.

Does rhabdomyolysis always damage the kidneys?

No. Kidney injury is an important risk, but it does not occur in every case. The risk is influenced by the extent of muscle damage, hydration, the underlying cause, and other health conditions.

Can I exercise again after rhabdomyolysis?

Many people return to exercise, but not immediately. Activity is usually restarted gradually after symptoms have settled and follow-up tests are reassuring. Recurrent or unexplained episodes may require specialist assessment first.

Can statins cause rhabdomyolysis?

They can rarely contribute to it, particularly when interacting with certain medicines or in people with other risk factors. Ordinary muscle pain does not necessarily mean rhabdomyolysis. New severe weakness, marked pain, or dark urine needs prompt medical assessment.

Sources

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