CONDITION

Lactic acidosis

Lactic acidosis is a buildup of lactate that makes the blood too acidic.

WHAT IT IS
Acid buildup caused by excess lactate in the blood

BODY SYSTEM
Whole body, especially blood and circulation

MAIN SYMPTOMS
Fast breathing, nausea, weakness, confusion

WHAT CAUSES IT
Low oxygen delivery, severe illness, medicines, or metabolic problems

HOW IT IS DIAGNOSED
Blood lactate, blood gas, and tests for underlying causes

MAIN TREATMENT
Treating the cause, restoring circulation, and supportive care

CAN IT BE CURED?
Sometimes - resolves when the cause is reversible

IS IT AN EMERGENCY?
Sometimes - with confusion, breathing trouble, or shock signs

LONG-TERM OUTLOOK
Often reversible; severe underlying illness can be life-threatening

Overview

Lactic acidosis happens when lactate builds up in your blood and the blood becomes too acidic. Lactate is a normal chemical made when cells turn sugar into energy. Your liver and kidneys usually process or remove it.

Lactate can rise when the body makes more than it can clear. This may happen if tissues are not receiving enough oxygen-rich blood, such as during shock or severe infection. It can also happen because of certain medicines, toxins, seizures, liver problems, or metabolic conditions.

A raised lactate level is not always the same as lactic acidosis. Exercise, stress, or a seizure can briefly raise lactate without causing lasting harmful acidity. Doctors interpret the lactate result together with your blood pH, symptoms, medical history, and other tests.

Lactic acidosis matters because it can be a sign of a serious underlying problem. Treatment

focuses on finding and correcting that problem rather than lowering the lactate number alone.

Symptoms

Symptoms may come from the acid buildup, but they are often mainly caused by the illness that triggered it. They can begin suddenly or develop over several hours.

Possible symptoms include:

Severe infection may also cause fever or chills. Poor circulation may cause cool, pale, or clammy skin and very little urine. A heart or lung problem may cause chest discomfort or shortness of breath.

These symptoms are not specific to lactic acidosis. Many other conditions can cause them, so symptoms alone cannot confirm the diagnosis.

- Fast, deep, or difficult breathing
- Nausea, vomiting, or abdominal discomfort
- Marked weakness or unusual tiredness
- Headache, confusion, sleepiness, or reduced alertness
- Dizziness, fainting, sweating, or a rapid heartbeat

Causes and risk factors

Doctors sometimes group lactic acidosis by whether the tissues appear to be receiving enough oxygen.

Reduced oxygen or blood flow is often called type A lactic acidosis. It can occur with:

Lactic acidosis without obvious oxygen shortage is often called type B. Possible causes include severe liver disease, reduced kidney function, some cancers, thiamine deficiency, inherited metabolic conditions, and certain medicines or toxins.

Metformin, a medicine used for type 2 diabetes, is linked to a rare form called metformin-associated lactic acidosis. The risk is mainly a concern when metformin builds up, such as during acute kidney injury, severe dehydration, shock, or serious liver or heart problems. Taking metformin as prescribed does not mean that you have or will develop lactic acidosis. Do not stop it without medical advice unless you are receiving emergency care.

Other possible triggers include carbon monoxide or cyanide poisoning and medicines such as linezolid or some older HIV treatments. Prolonged high-dose propofol, which is used for

sedation in closely monitored settings, can also be associated with lactic acidosis.

Heavy alcohol use may contribute, especially alongside poor nutrition, liver disease, or another illness.

Intense exercise can temporarily increase lactate. The body usually clears it after activity stops, and this is not usually the same as dangerous lactic acidosis.

A less common form, D-lactic acidosis, can affect people with short bowel syndrome. This means that much of the small intestine is missing or no longer functions. Gut bacteria produce a different form of lactate, which can cause episodes of confusion, slurred speech, or poor coordination.

- Sepsis, which is a dangerous body-wide response to infection
- Shock from severe bleeding, dehydration, heart failure, or another cause
- Cardiac arrest or severe heart and circulation problems
- Severe breathing failure
- Loss of blood flow to part of the body, such as the intestines or a limb
- Prolonged seizures

Diagnosis

Lactic acidosis is confirmed with blood tests. A lactate test measures how much lactate is in the blood. A blood gas test measures acidity, including the blood pH and bicarbonate level.

There is no single lactate value that explains every situation. Doctors look for a raised lactate together with evidence that the blood is acidic. They may repeat the test to see whether the level is rising or falling after treatment.

Other blood tests may include:

Depending on the likely cause, you may need an electrocardiogram, chest imaging, cultures to look for infection, or scans to check blood flow and internal organs.

Blood collection and handling can affect lactate results. Clenching your fist for a long time or delays in processing the sample may raise the result. An unexpected result may therefore be checked again if your condition allows.

Standard lactate tests mainly measure L-lactate. If D-lactic acidosis is suspected in someone with short bowel syndrome, a specialised D-lactate test may be needed.

- Electrolytes and the anion gap, which help identify excess acid

- Kidney and liver function tests
- Blood glucose and ketones
- A full blood count and tests for infection
- Tests for specific medicines or toxins when relevant

Treatment and management

Treatment is usually given in hospital when lactic acidosis is significant or linked to an acute illness. The main goal is to restore normal circulation and oxygen delivery while treating the cause.

Supportive treatment may include oxygen, intravenous fluids, blood products for severe bleeding, or breathing support. The exact approach depends on your heart, lungs, kidneys, circulation, and the cause of the problem.

Cause-specific treatment may involve:

Dialysis, which filters the blood, may be used in selected severe cases. Examples include serious metformin poisoning, kidney failure, or acidosis that does not improve with other treatment.

Sodium bicarbonate can reduce acidity temporarily, but it does not correct the underlying cause and is not routinely suitable for every case. Specialists may consider it in particular circumstances, especially when acid levels are extreme or certain other problems are present.

Blood lactate, acidity, urine output, blood pressure, and organ function are often checked repeatedly. A falling lactate can be a helpful sign, but recovery also depends on whether the underlying illness is improving.

- Antibiotics and control of the infection source for sepsis
- Treatment to restore blood flow in shock or a blocked blood vessel
- Medicines to stop ongoing seizures
- Treatment for heart or breathing failure
- Thiamine replacement when deficiency is suspected
- An antidote or other specialist treatment for certain poisonings
- Reviewing and stopping a contributing medicine under medical supervision

Complications

Severe or prolonged acidity can interfere with how the heart, blood vessels, and other organs work. Possible complications include low blood pressure, abnormal heart rhythms, kidney injury, breathing failure, reduced consciousness, and failure of several organs.

The risk of complications is usually driven by the cause. Lactic acidosis from a brief seizure may clear quickly, while lactic acidosis from severe sepsis or major loss of blood flow may be much more serious.

D-lactic acidosis can cause repeated neurological episodes, including confusion, unsteady walking, and slurred speech. These symptoms often improve when the episode is treated, but recurrence is possible if the underlying short bowel problem remains.

Prevention

Lactic acidosis cannot always be prevented. Events such as severe infection, shock, or an inherited metabolic problem may occur despite appropriate care.

You may be able to reduce some risks by:

Never change or stop a regular medicine solely because lactic acidosis appears in its safety information. A clinician or pharmacist can explain how the warning applies to your health and what to do during an acute illness.

- Taking medicines only as directed and attending recommended monitoring
- Asking for a clear sick-day plan if you take metformin or have kidney disease
- Getting medical advice for persistent vomiting, diarrhoea, or dehydration
- Seeking timely care for serious infections or worsening heart, lung, liver, or kidney disease
- Avoiding heavy alcohol use, particularly with poor nutrition or liver disease
- Using fuel-burning heaters, generators, and vehicles safely to prevent carbon monoxide exposure

Living with it and what to expect

Lactic acidosis is usually an acute event rather than a condition that continues on its own for months or years. Once circulation and oxygen delivery improve, the body may clear excess lactate within hours. Recovery from the underlying illness can take much longer.

Some people recover without lasting effects, especially when the cause is brief and quickly

corrected. Others need longer hospital treatment or rehabilitation because the triggering illness damaged the kidneys, heart, brain, muscles, or another organ.

Follow-up may include repeat kidney or liver tests, a review of medicines, and care for the condition that caused the episode. If a medicine contributed, your healthcare team may change it or decide whether it can be restarted safely.

Recurrent episodes are unusual unless there is an ongoing cause. People with short bowel syndrome, mitochondrial or other metabolic disorders, advanced organ disease, or continuing exposure to a triggering medicine or toxin may need specialist follow-up.

Future health is determined more by the underlying cause than by the lactate level alone. A temporary rise after exercise has a very different outlook from lactic acidosis caused by severe infection or shock.

When to get medical help

Call emergency services now if you or someone else has:

If carbon monoxide exposure is possible, leave the area for fresh air without delaying and call emergency services. Do not re-enter an unsafe building.

Seek urgent same-day medical advice for persistent vomiting or diarrhoea, worsening dehydration, rapid breathing, unusual weakness, or reduced urine output. This is especially important if you take metformin or have kidney, liver, heart, or lung disease.

Routine follow-up is appropriate after recovery to review test results, medicines, and the underlying cause. A mildly raised lactate found during testing does not always mean there is an emergency, but it must be interpreted in its clinical setting.

- Severe difficulty breathing
- New confusion, extreme drowsiness, or loss of consciousness
- Fainting with pale, cold, or clammy skin
- Chest pain or signs of a heart attack
- A seizure lasting several minutes or repeated seizures
- Suspected carbon monoxide, cyanide, or medicine poisoning
- Signs of shock, such as profound weakness, very little urine, or collapse

Common questions

Is lactic acidosis the same as having a high lactate level?

No. Lactate can rise briefly after exercise, stress, or a seizure. Lactic acidosis means that excess lactate is present along with harmful acidity in the blood. Doctors use blood tests and your overall condition to tell the difference.

Can metformin cause lactic acidosis?

It can be associated with lactic acidosis, but this is mainly a concern when the medicine accumulates or another severe illness is present. Acute kidney injury, dehydration, shock, or major liver or heart problems may increase the risk. Do not stop prescribed metformin without appropriate medical advice.

Is lactic acidosis the same as diabetic ketoacidosis?

No. Diabetic ketoacidosis is caused by a buildup of chemicals called ketones because the body lacks effective insulin. Lactic acidosis is caused by excess lactate. Both can make the blood acidic, and they can occasionally occur together.

Can exercise cause lactic acidosis?

Intense exercise raises lactate because working muscles need energy quickly. This increase is usually temporary and clears during recovery. Persistent symptoms, fainting, chest pain, severe breathlessness, or confusion are not normal exercise effects and need prompt assessment.

How long does lactic acidosis take to go away?

Lactate may fall within hours when a brief, reversible cause is corrected. Recovery can take days or longer if the cause is severe infection, shock, organ failure, or poisoning. Repeat blood tests help show whether treatment is working.

Can anxiety cause lactic acidosis?

Anxiety and rapid breathing may cause small changes in lactate, but they do not safely explain severe or persistent acidosis. New rapid breathing, weakness, confusion, or fainting should not be assumed to be anxiety without medical assessment.

Sources

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