TEST

Ketones blood test

A ketones blood test measures ketones made when your body uses fat for energy

WHAT IT MEASURES
Beta-hydroxybutyrate, the main ketone in blood

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
A few minutes

RESULTS IN
Minutes at point of care; hours in laboratories

USED FOR
Diagnosis and monitoring

MAIN LIMITATION
Raised ketones do not always mean diabetic ketoacidosis

Overview

A ketones blood test measures chemicals your liver makes when your body uses fat for energy. Ketone production can increase when there is not enough insulin, when you have eaten very little carbohydrate, or during prolonged fasting.

Most blood ketone tests measure beta-hydroxybutyrate , the main ketone found during diabetic ketoacidosis. Diabetic ketoacidosis, often shortened to DKA, is a serious complication caused by too little effective insulin and a build-up of acids in the blood.

The test may use blood from a finger prick or a vein. Some glucose meters can also measure ketones, but they require ketone-specific strips.

A blood ketone result cannot diagnose DKA by itself. Healthcare teams also consider your symptoms, blood glucose, blood acidity, electrolytes and general condition.

Why the test is ordered

The test is most often used to investigate or monitor possible DKA. It can show rising ketones

earlier than a urine test because blood levels change more quickly.

It may be ordered when you have diabetes and:

SGLT2 inhibitors are medicines such as dapagliflozin, empagliflozin and canagliflozin. Rarely, DKA can develop while taking one of these medicines even when blood glucose is not very high.

Blood ketones may also be checked when prolonged fasting, heavy alcohol use, severe illness or another metabolic problem is being assessed. In these situations, raised ketones do not necessarily mean DKA.

- Your blood glucose is high or rising unexpectedly
- You are unwell, especially with vomiting or an infection
- You have symptoms that could occur with DKA
- Your insulin pump may have stopped delivering insulin
- You take an SGLT2 inhibitor and feel unwell
- You are being treated for DKA and need repeat measurements

Who should have the test

Ketone testing is not usually part of a routine health check for someone without symptoms or a relevant medical condition.

If you have diabetes, your care team may recommend home ketone testing during illness or when glucose is above the level in your personal sick-day plan. Testing can be particularly important for people who use insulin, including insulin-pump users.

You may also be advised to test during pregnancy if you have diabetes or develop high glucose. Pregnancy can increase ketone production, so results need interpretation in the context of your glucose, food intake and symptoms.

Seek urgent medical advice if ketones are rising, remain above the action level in your plan, or occur with vomiting. Seek emergency care for deep or difficult breathing, severe weakness, confusion, marked drowsiness, persistent vomiting or severe abdominal pain. Do not delay emergency assessment to repeat a home test.

How to prepare

No fasting is normally needed. If the test is being done as part of a wider set of blood tests, you

may be given separate fasting instructions for those tests.

Continue medicines unless a healthcare professional has told you otherwise. If you use insulin, do not omit it simply because you are eating less. Follow your diabetes sick-day plan.

Tell the person arranging the test about:

For home testing, check that the meter accepts blood ketone strips. Use an unexpired strip made for that meter, and store strips as directed by the manufacturer.

- Diabetes medicines, particularly SGLT2 inhibitors
- Recent insulin doses
- Vomiting, fasting or a very low-carbohydrate diet
- Alcohol use
- Pregnancy
- Recent strenuous exercise

What happens during the test

For a finger-prick test, you clean and dry your hands, then use a lancet to obtain a small drop of blood. The blood is placed on a ketone strip inserted into a compatible meter. A result usually appears within seconds.

In a clinic or hospital, blood may instead be taken from a vein in your arm. The sample can be tested in a nearby analyser or sent to a laboratory.

If DKA is possible, other tests are usually performed at the same time. These may include blood glucose, electrolytes, kidney function and a blood gas test, which measures blood acidity.

Understanding your results

Blood beta-hydroxybutyrate is commonly reported in millimoles per litre, written as mmol/L. A higher number means more ketones are circulating in your blood.

There is no single interpretation suitable for every situation. Ranges and action levels vary by laboratory, testing device, age, sex, pregnancy status, medicines and clinical context.

Many hospital protocols use a beta-hydroxybutyrate level of 3.0 mmol/L or higher as evidence of significant ketonaemia, meaning excess ketones in the blood. DKA is diagnosed only when ketones occur with diabetes or raised glucose and metabolic acidosis, which means the blood

has become too acidic. DKA can sometimes occur at lower-than-expected glucose levels, particularly with SGLT2 inhibitors, pregnancy or reduced food intake.

For a home result, follow the action levels supplied with your meter and your personal diabetes plan. A mildly raised result without concerning symptoms may call for fluids, prescribed insulin and repeat testing under that plan. A high or rising result requires prompt medical advice.

What affects the results

Several factors can raise ketones without meaning you have DKA:

SGLT2 inhibitors can allow substantial ketone production without very high glucose. A normal glucose reading therefore does not rule out DKA if you take one of these medicines and feel unwell.

Recent insulin and intravenous fluids can lower beta-hydroxybutyrate quickly. A result taken after treatment may not show how high the level was beforehand. During recovery, urine ketones can remain positive after blood beta-hydroxybutyrate has fallen.

Home meter results can be misleading if strips are expired, damp, stored at the wrong temperature or incompatible with the meter. Cold hands, poor circulation, too little blood on the strip and an unusually high or low proportion of red blood cells may also affect some devices.

Kidney and liver function can influence ketone production or clearance. These factors are interpreted alongside the rest of your clinical information rather than used to correct the number.

- Fasting, missed meals or a very low-carbohydrate diet
- Prolonged or strenuous exercise
- Vomiting or an illness that reduces food intake
- Pregnancy
- Heavy alcohol use
- Recent changes in insulin delivery

Accuracy and limitations

Direct beta-hydroxybutyrate testing is generally more useful for suspected DKA than urine ketone testing. Urine strips mainly detect acetoacetate, a different ketone that may lag behind

changes in the blood.

In one emergency-department study, a point-of-care beta-hydroxybutyrate threshold above 1.5 mmol/L identified about 98 in every 100 people who had DKA. However, among people without DKA, about 21 in every 100 also crossed that threshold. This lower threshold was useful for finding nearly all possible cases, but it could not confirm DKA on its own.

A 2024 international consensus report states that beta-hydroxybutyrate at or above 3.0 mmol/L has greater than 90% ability both to identify DKA and to correctly exclude it in studied clinical settings. Performance still differs by device, threshold and patient group.

A low result can be falsely reassuring if the sample was taken after insulin, if testing was done very early, or if a meter or strip was used incorrectly. A raised result may reflect fasting, alcohol or another cause rather than DKA. Blood gas and electrolyte tests are better for determining whether acidosis is present.

Risks and complications

A finger prick or venous blood draw may cause brief discomfort, a small bruise or light-headedness. Serious complications from collecting the sample are uncommon.

What happens next

A result within the expected range may need no further action, or it may be repeated if symptoms continue. Your glucose and the reason for testing remain important.

A mildly raised result may lead to repeat testing, fluids and use of prescribed insulin according to your sick-day plan. Routine follow-up may be appropriate when the level falls and you remain well.

High or increasing ketones need prompt assessment, especially with diabetes, pregnancy, an insulin-pump problem or SGLT2 inhibitor use. Hospital evaluation may include blood acidity, electrolytes and kidney-function tests.

Get emergency help if you have ketones with persistent vomiting, deep or rapid breathing, confusion, severe drowsiness, collapse or severe abdominal pain. These symptoms should not wait for a routine appointment.

Common questions

Can I drink coffee before a ketones blood test?

Usually, yes, because fasting is not required. Sugar, milk or a carbohydrate-containing drink may affect glucose and ketone production, so follow any instructions given for other tests being done at the same time.

Does the time of day matter?

There is no standard time for the test. Ketones may be higher after an overnight fast, but urgent testing should be done when needed rather than delayed until a particular time.

Can I exercise beforehand?

Strenuous or prolonged exercise can raise ketones. Avoid exercise if your glucose is high, ketones are present or you feel unwell, and follow your diabetes plan.

Can I test ketones with my glucose meter?

Only if the meter is designed for ketone testing. You must use compatible blood ketone strips, not glucose strips.

Is a blood test better than a urine ketone test?

For suspected DKA, blood beta-hydroxybutyrate usually reflects the current situation more accurately. Urine results can be delayed and may remain positive while you are recovering.

Can I have DKA with normal blood glucose?

It is possible to have DKA without markedly raised glucose. This is more likely with SGLT2 inhibitors, pregnancy or reduced food intake, so symptoms and ketone results still require attention.

Sources

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