TEST

Sweat electrolytes test

A sweat electrolytes test measures chloride in sweat to help diagnose cystic fibrosis.

WHAT IT MEASURES
Chloride concentration, and sometimes sodium, in sweat

SAMPLE
Sweat

FASTING NEEDED?
No

HOW LONG IT TAKES
About 45 to 60 minutes

RESULTS IN
Same day to several days; laboratory schedules differ

USED FOR
Confirming or ruling out cystic fibrosis

MAIN LIMITATION
Too little or contaminated sweat can invalidate results

Overview

A sweat electrolytes test measures salts in a sample of your sweat. The most important measurement is usually chloride. Chloride helps control fluid balance and normally moves in and out of cells through a protein called CFTR.

In cystic fibrosis, changes in the CFTR gene affect how chloride moves across certain tissues. This usually leads to more chloride in sweat than expected. The test can therefore help confirm or rule out cystic fibrosis after an abnormal newborn screening result or when symptoms suggest the condition.

The test does not involve a needle. A small electrical current and a medicine called pilocarpine stimulate one area of skin to produce sweat. The sweat is then collected and tested.

Some laboratories also report sweat sodium or overall electrical conductivity. These measurements may support assessment, but a properly collected sweat chloride level is the main diagnostic measurement.

Why the test is ordered

The test is most often ordered to investigate cystic fibrosis. Reasons include:

Possible reasons for testing later in life include repeated chest infections, unexplained widening of the airways called bronchiectasis, poor growth, difficulty absorbing food, repeated pancreatitis, or certain fertility problems. These concerns can have many causes, so needing the test does not mean you have cystic fibrosis.

Sweat chloride is not usually used to measure how severe cystic fibrosis is or to predict how the condition will progress.

- Following up an abnormal newborn screening result
- Investigating symptoms that could be related to cystic fibrosis
- Testing someone with a close relative who has the condition
- Clarifying an uncertain genetic test result

Who should have the test

You may be offered testing if a newborn screening blood test suggests an increased chance of cystic fibrosis. Screening does not make the diagnosis; a sweat test is usually needed to find out more.

Children and adults may also be tested when their medical history, examination, family history, or other test results raise the possibility of cystic fibrosis. People with an inconclusive earlier result may need the test repeated at a specialist centre.

Very young babies sometimes cannot produce enough sweat. Testing is generally delayed until after the first 48 hours of life, and the centre may consider the baby's age, weight, hydration, and health when scheduling it.

How to prepare

You do not need to fast. You can usually eat and drink normally, including water, before the appointment. Being normally hydrated can help you produce enough sweat, but there is no need to drink excessive amounts.

Do not apply creams, lotions, oils, or ointments to the planned collection area on the day of the test unless the testing centre gives different instructions. These products can interfere with collection or contaminate the sample.

Take your usual medicines unless you have been specifically told otherwise. Tell the testing team about all medicines and treatments, particularly CFTR modulator medicines used for cystic fibrosis.

Wear clothing that allows easy access to an arm or leg. Babies may need to be kept comfortably warm so that they produce enough sweat.

What happens during the test

A trained member of staff cleans a small area, usually on the forearm. For babies, the thigh may sometimes be used.

Pilocarpine is placed on the skin. A mild electrical current is passed through pads for several minutes, helping the medicine stimulate the sweat glands. You may notice warmth or tingling, but the procedure should not be painful.

The area is cleaned again. Sweat is collected in special gauze, filter paper, or a small plastic coil. Collection normally takes about 30 minutes. The sample is weighed or checked to make sure there is enough, then sent for measurement.

The appointment often lasts 45 to 60 minutes. If too little sweat is collected, the test cannot be interpreted and may need to be repeated. This is more common in young babies and is not an abnormal result.

Understanding your results

Sweat chloride is usually reported in millimoles per litre, written as mmol/L. Commonly used interpretation categories are:

A result does not stand alone. Ranges and interpretation can vary by laboratory, age, sex, pregnancy status, medicines, and clinical context. Your result should be considered with your symptoms, newborn screening result, family history, and any genetic testing.

An intermediate result does not confirm or exclude cystic fibrosis. The test is usually repeated, and genetic or specialist tests may be recommended.

A high result is generally confirmed on a separate sample or supported by other evidence before a diagnosis is made. Sweat sodium alone should not be used to diagnose cystic fibrosis.

- 29 mmol/L or lower: cystic fibrosis is unlikely
- 30 to 59 mmol/L: an intermediate result needing further assessment

- 60 mmol/L or higher: consistent with cystic fibrosis

What affects the results

The collection and handling of sweat matter as much as the measurement itself. A result can be misleading even when the laboratory equipment works correctly.

Too little sweat is the most common practical problem. This can happen in very young babies, in a cool environment, or when the person is not well hydrated. The laboratory should report the sample as insufficient rather than estimate a result.

Creams, skin products, dirt, or salt left on the skin can contaminate the sample. Evaporation during collection or transport can make the chloride appear higher. Collection from inflamed, damaged, or heavily swollen skin may also be unreliable.

Acute illness, dehydration, poor nutrition, or significant swelling caused by low blood protein can affect testing or make collection difficult. The centre may recommend waiting until these issues have improved.

CFTR modulator medicines can lower sweat chloride. If you already take one, the result must be interpreted with your treatment history. Do not stop prescribed medicine for the test unless your specialist team tells you to.

Age affects how easily sweat can be collected and may influence interpretation. Pregnancy and medicines that alter salt or fluid balance should also be considered. A recent blood transfusion does not usually affect sweat chloride because the test does not measure blood cells.

Accuracy and limitations

When collected and analysed correctly, sweat chloride is the standard confirmatory test for cystic fibrosis. However, no test identifies every affected person or excludes the condition in every situation.

A falsely high result means the test suggests cystic fibrosis when the person does not have it. This can result from contamination, evaporation, technical problems, or a small number of other medical conditions. Repeating the test at an experienced laboratory helps reduce this risk.

A falsely low result means the chloride level is not raised even though cystic fibrosis or a related CFTR disorder is present. This can occur with some uncommon CFTR gene changes or

after treatment with a CFTR modulator.

There is no single meaningful missed-case or false-alarm rate for every setting. Accuracy changes with collection quality, age, the reason for testing, and which CFTR variants are present.

When results remain uncertain, CFTR genetic analysis may provide more information. Specialist centres can also use tests of CFTR function, such as nasal electrical measurements, in selected cases.

Risks and complications

The test is low risk. You may feel tingling during stimulation and may have temporary redness where the pads were placed.

Minor skin irritation is possible, and a small burn is rare when proper equipment and procedures are used. The test does not involve radiation or a blood draw.

What happens next

A result in the expected low range often needs no further testing when there are no strong clinical concerns. If symptoms or family history remain important, further assessment may still be appropriate.

An intermediate, high, or technically inadequate result usually leads to routine follow-up. This may include a repeat sweat test, CFTR genetic testing, and review by a cystic fibrosis specialist team. This follow-up is important but is not usually an emergency.

Do not wait for a scheduled test result if you or your child develops severe breathing difficulty, blue or grey lips, unusual drowsiness, or signs of severe dehydration such as very little urine and difficulty staying awake. Seek urgent or emergency medical care for those symptoms regardless of the planned testing.

Common questions

Can I drink coffee before a sweat electrolytes test?

Usually, yes. The test does not require fasting, and normal food and drinks are generally allowed. Follow any different instructions provided by your testing centre.

Does the time of day matter?

Usually not. The quality and amount of collected sweat are more important than the time of day. Laboratories may schedule babies when staff and suitable testing facilities are available.

Can I exercise beforehand?

Ordinary activity is unlikely to matter, but avoid becoming dehydrated through strenuous exercise. The test uses locally stimulated sweat, so you do not need to exercise to produce the sample.

Can I use deodorant or moisturiser?

Avoid creams, oils, lotions, and ointments on the collection area on the day of testing. Deodorant elsewhere on the body is unlikely to affect a forearm or thigh sample.

Will the test hurt?

Most people feel mild tingling or warmth while the sweat glands are stimulated. Tell the staff if the area becomes painful or feels unusually hot.

What if not enough sweat is collected?

The laboratory will report that the sample is insufficient, not that the result is normal or abnormal. You will usually be offered another appointment, sometimes when a baby is older or better hydrated.

Sources

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- National Institute for Health and Care Excellence. Cystic fibrosis: diagnosis and management. NICE guideline NG78
- MedlinePlus. Sweat Chloride Test