TEST

Leukocyte esterase urine test

A leukocyte esterase urine test checks for an enzyme from white blood cells that may suggest urinary tract inflammation or infection.

WHAT IT MEASURES
Enzyme released by white blood cells in urine

SAMPLE
Urine

FASTING NEEDED?
No

HOW LONG IT TAKES
About five minutes to collect urine

RESULTS IN
Minutes to one day, based on laboratory workflow

USED FOR
Supporting assessment of urinary inflammation and possible infection

MAIN LIMITATION
Contamination can cause positive results without urinary infection

Overview

A leukocyte esterase test is usually part of a urine dipstick test. The dipstick is a thin strip containing chemical pads that change colour when certain substances are present.

Leukocyte esterase is an enzyme released by some white blood cells. White blood cells help the immune system respond to infection and inflammation. Finding this enzyme suggests that white blood cells may be present in your urine, a finding sometimes called pyuria .

A positive result can support the possibility of a urinary tract infection, or UTI. However, the test cannot confirm an infection by itself. White blood cells can enter urine for other reasons, and the sample can be contaminated during collection.

The result is often considered alongside symptoms and other urine findings. These may include nitrite, blood, protein, urine microscopy and a urine culture.

Why the test is ordered

The test is commonly ordered when your symptoms could be related to a UTI. These may include pain or burning when urinating, needing to urinate more often, sudden urgency, lower abdominal discomfort or changes in the appearance of urine.

It may also be used when a clinician is investigating:

Leukocyte esterase may be included automatically when a laboratory performs a urinalysis. A urinalysis is a group of tests that examine the appearance, concentration and chemical contents of urine.

The test is not a reliable stand-alone way to screen everyone for a UTI. In situations where finding bacteria without symptoms matters, such as during pregnancy, a urine culture may be the more appropriate test.

- Fever or illness without a clear cause
- Pain in the back or side near the kidneys
- Possible urinary inflammation
- An abnormal result from another urine test
- Symptoms that continued or returned after treatment

Who should have the test

You may have this test if you have urinary symptoms or if another finding suggests that your urine should be examined. The decision also depends on your age, pregnancy status, medical history and risk of complications.

Children may have urine dipstick testing when a UTI is suspected, but collecting an uncontaminated sample can be difficult. The meaning of the result also differs by age and symptoms.

Older adults may have bacteria or white blood cells in their urine without a urinary infection causing illness. A positive dipstick alone does not show that new symptoms, such as confusion, are caused by a UTI.

People without urinary symptoms do not usually benefit from dipstick testing solely to look for infection. There are specific exceptions in which urine testing may be recommended, including pregnancy and before certain procedures involving the urinary tract. The exact test used may be a urine culture rather than leukocyte esterase alone.

How to prepare

You do not need to fast. Continue your usual medicines unless you have received different instructions.

Follow the collection instructions carefully. You will often be asked for a clean-catch, midstream sample . This means cleaning around the urinary opening, beginning to urinate into the toilet and then collecting urine partway through the stream.

Do not deliberately drink a large amount of water just before collecting the sample. Excess fluid can make urine unusually dilute.

Tell the person arranging the test if you are menstruating, have vaginal discharge, are pregnant, recently took antibiotics or use medicines or supplements that change urine colour. These details can affect collection or interpretation.

What happens during the test

You will usually receive a clean container. After collecting the urine, replace the lid without touching the inside of the container.

A dipstick is briefly placed into the urine. The leukocyte esterase pad changes colour if the enzyme is detected. It is read after a set time, either by eye or with an automated reader.

Collection usually takes only a few minutes. Testing may happen immediately in a clinic, or the sample may be sent to a laboratory.

If a urine culture is needed, part of the sample is placed under conditions that allow bacteria to grow. Culture results take longer than dipstick results and can help identify the bacteria and which antibiotics like amoxicillin or doxycycline may work against them.

Understanding your results

Results are commonly reported as negative, trace or positive. Some laboratories grade positive results as small, moderate or large. Reporting categories and thresholds differ between dipstick brands and laboratories.

A negative result means the test did not detect a meaningful amount of leukocyte esterase. This makes a UTI less likely in some situations, but it does not completely rule one out.

A positive result suggests that white blood cells are present. It does not show why they are present and does not identify bacteria. Possible explanations include a UTI, inflammation elsewhere in the urinary tract or contamination from genital secretions.

A positive nitrite result together with leukocyte esterase can provide stronger support for a bacterial UTI than either result alone. However, many bacteria do not produce nitrite, and urine may not have remained in the bladder long enough for nitrite to form.

There is no single universal normal range beyond the general expectation that leukocyte esterase is negative. Interpretation varies by laboratory, age, sex, pregnancy status, medicines, collection method, symptoms and the wider clinical context.

What affects the results

The most important problem is contamination. White blood cells from vaginal fluid, menstrual blood or skin around the urinary opening can enter the container even when the urinary tract is not inflamed. A clean-catch sample reduces this risk but cannot remove it completely.

Other factors include:

Exercise does not usually have an important direct effect on leukocyte esterase. However, strenuous exercise can temporarily affect blood or protein results included on the same urinalysis.

Pregnancy and age do not necessarily alter the chemical reaction itself, but they affect how a result is interpreted and whether a culture is needed. A recent blood transfusion does not usually have a direct effect on this test.

- Very concentrated urine: High urine concentration can reduce the dipstick's ability to detect leukocyte esterase.
- High glucose, protein or ketone levels: Large amounts may interfere with some dipstick reactions and cause a false-negative result.
- Vitamin C: High amounts can interfere with some dipstick brands.
- Medicines: Certain antibiotics and medicines that strongly colour urine can affect some tests or make colour changes difficult to read.
- Recent antibiotics: Treatment may lower bacterial numbers before a culture, even if urinary inflammation remains.
- Storage delays: A sample left at room temperature for too long may change as cells break down or bacteria multiply.
- Cleaning chemicals: Residue from strong oxidizing cleaners can produce a misleading positive reaction.

- Collection devices: Urine bags, particularly in young children, are more easily contaminated than carefully collected clean-catch or catheter samples.

Accuracy and limitations

Leukocyte esterase is useful as a quick screening clue, not as proof of infection. How often it is right or wrong changes with the symptoms being investigated, the quality of the sample, the dipstick threshold and what test is used for comparison.

The test can miss a UTI when there are few white blood cells, the urine is very concentrated or substances in the urine interfere with the test pad. A negative result is therefore less reassuring when symptoms strongly suggest an infection.

It can also say "positive" when there is no bacterial UTI. Contamination, urinary stones, inflammation of the urethra and some kidney conditions may place white blood cells in urine without a typical bladder infection.

Urine microscopy can directly count white blood cells and look for bacteria. A urine culture is better when confirming bacteria or identifying the likely organism matters. Neither test should be interpreted without considering symptoms and how the sample was collected.

Risks and complications

Providing a urine sample is not invasive and has no significant physical risk. The main practical problem is an unclear or contaminated result, which may lead to repeat testing.

A catheter may occasionally be used to collect urine. Insertion can cause brief discomfort and carries a small risk of irritation or infection.

What happens next

A negative result may need no further action when symptoms are mild and another explanation is more likely. If symptoms continue, your clinician may request microscopy, a urine culture or assessment for another cause.

After a positive result, the next step depends on your symptoms and health history. You may be asked for a repeat clean-catch sample or a urine culture. Treatment decisions should not be based only on the dipstick result.

Seek prompt medical advice if urinary symptoms occur with fever, pain in your back or side,

repeated vomiting, worsening illness or pregnancy. Severe lower abdominal pain with an inability to urinate also needs urgent assessment.

Call emergency services for severe confusion, fainting, difficulty breathing or if you are difficult to wake. These are emergency symptoms rather than routine follow-up for a dipstick result.

Common questions

Can I drink coffee before the test?

Usually, yes. Fasting is not required. Avoid drinking much more coffee or water than usual because a large amount of fluid may dilute your urine.

Does the time of day matter?

Not usually. A first-morning sample is more concentrated and may be requested for some urine tests, but leukocyte esterase testing can often be performed at any time. Follow the instructions provided for your sample.

Can I exercise beforehand?

Normal activity is unlikely to affect leukocyte esterase. Strenuous exercise can temporarily cause blood or protein to appear on other parts of a urine dipstick, so mention recent intense exercise if your broader urinalysis is abnormal.

Can I take the test during my period?

You can, but menstrual blood and genital white blood cells may contaminate the sample. If the test is not urgent, you may be asked to collect it after bleeding stops. If testing cannot wait, tell the laboratory or clinic that you are menstruating.

Will antibiotics affect the result?

They can. Antibiotics may reduce bacteria in the urine and can make a culture negative, especially if treatment has already started. Some antibiotics can also interfere with particular dipsticks. Do not stop prescribed antibiotics unless instructed to do so.

What if leukocyte esterase is positive but nitrite is negative?

This combination does not confirm or exclude a UTI. Some bacteria do not produce nitrite, frequent urination may prevent nitrite from forming, and white blood cells may be present for reasons other than infection. Symptoms, sample quality and culture results help clarify the finding.

Sources

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