TEST

# Urine specific gravity test

A urine specific gravity test measures how concentrated or dilute your urine is

**WHAT IT MEASURES**
How concentrated or dilute your urine is

**SAMPLE**
Urine

**FASTING NEEDED?**
No

**HOW LONG IT TAKES**
About 5 to 10 minutes

**RESULTS IN**
Same day to two days, varying by laboratory

**USED FOR**
Screening, diagnosis, and monitoring fluid balance

**MAIN LIMITATION**
Hydration and dissolved substances can mislead a single result

## Overview

A urine specific gravity test measures the concentration of your urine. It compares the density of urine with the density of pure water.

Your kidneys help control the amount of water and dissolved material that leaves your body. Concentrated urine contains less water in relation to substances such as salts and waste products. Dilute urine contains more water.

Specific gravity is usually measured as part of a urinalysis, which is a group of tests performed on a urine sample. It may be checked with a test strip or an instrument called a refractometer.

This test does not identify a condition by itself. A result needs to be considered with your fluid intake, symptoms, medicines, kidney function, and other blood or urine tests. The test itself has no symptoms or prognosis.

## Why the test is ordered

A urine specific gravity test can help show how your kidneys are concentrating or diluting

urine. It may be ordered to:

The test may be part of a routine urinalysis. However, one unexpected result does not usually establish a diagnosis.

If a problem involving water balance is suspected, specific gravity may be combined with urine osmolality. Osmolality measures the number of dissolved particles and is often more useful for a detailed assessment.

- Assess hydration
- Investigate unusually frequent urination or intense thirst
- Check how the kidneys respond to changes in fluid intake
- Support an assessment of kidney function or fluid-balance conditions
- Monitor someone receiving fluids or treatment that affects water balance
- Add context to other urinalysis results

## Who should have the test

You may have this test during a routine urine check or when a healthcare professional is investigating changes in thirst, urine volume, hydration, or kidney function.

It may also be used when blood tests show an unexpected sodium level or when a condition affecting water regulation is being assessed. Examples include disorders in which the body produces too much urine or retains too much water.

Children, older adults, and pregnant people can have the test. Interpretation may differ with age, pregnancy status, medicines, kidney function, and the reason for testing.

## How to prepare

Fasting is not normally needed. You can usually eat and drink as you normally would unless you have been given different instructions for other tests.

Do not deliberately drink a large amount of water before providing the sample. This can dilute your urine. You also should not restrict fluids unless you are taking part in a medically supervised test.

Tell the person arranging the test about medicines and supplements you take. Diuretics like furosemide or hydrochlorothiazide , sometimes called water tablets, can change urine concentration. Intravenous fluids and some medicines used during hospital care can also

affect the result.

If possible, ask whether a first-morning sample is required. Urine is often more concentrated after sleep, making the collection time important when results are compared.

## What happens during the test

You will be given a clean container and asked to provide a urine sample. For a clean-catch sample, you usually begin urinating into the toilet, collect urine from the middle of the stream, and finish in the toilet.

Avoid touching the inside of the container or lid. Follow the collection instructions you receive, because they may differ for children, people using catheters, or timed urine collections.

In the laboratory, specific gravity may be measured using a dipstick or refractometer. A dipstick changes colour according to the urine's chemical properties. A refractometer measures how light bends as it passes through the sample.

Collection usually takes only a few minutes. If specific gravity is part of a wider urinalysis, the same sample may also be checked for blood, protein, glucose, infection markers, and cells.

## Understanding your results

Specific gravity is reported as a number without a unit. Pure water has a specific gravity of 1.000. Urine is usually higher because it contains dissolved salts and waste products.

A higher result means the urine is more concentrated. This can occur after limited fluid intake, sweating, vomiting, or diarrhoea. Glucose, protein, contrast dye, or some medicines in the urine can also raise the result without representing ordinary concentration from water loss.

A lower result means the urine is more dilute. This may occur after drinking plenty of fluid, receiving intravenous fluids, or taking a diuretic. Persistently dilute urine may lead to further assessment of kidney concentrating ability or the hormones that regulate water balance.

A result within the laboratory's range does not rule out every problem. A single sample is only a snapshot, and concentration normally changes throughout the day.

Reference ranges and interpretation vary by laboratory, testing method, age, sex, pregnancy status, medicines, kidney function, and clinical context. Compare your result with the range printed on your report rather than a range found elsewhere.

## What affects the results

Urine concentration can change quickly even when there is no disease. Important influences include:

Glucose and protein can make urine denser. A refractometer may therefore give a high specific gravity even when urine particle concentration does not fully match that result.

Recent imaging contrast can also raise refractometer readings. Mannitol, a medicine that draws water into urine, can have a similar effect.

Very alkaline urine may make some dipstick measurements less reliable. Menstrual blood or vaginal discharge may affect other parts of a urinalysis, although they do not usually cause a major specific gravity change by themselves.

A recent blood transfusion does not usually alter urine specific gravity directly, but the illness, fluids, or medicines surrounding it may do so.

- Recent fluid intake: Drinking a large amount can produce a low result
- Fluid loss: Sweating, fever, vomiting, or diarrhoea can concentrate urine
- Time of day: First-morning urine is often more concentrated
- Exercise: Recent strenuous activity and sweating can raise concentration
- Medicines: Diuretics and medicines affecting water balance can change results
- Intravenous fluids: These may dilute urine, depending on the fluid and timing
- Kidney function: Reduced concentrating ability can alter the expected response
- Pregnancy and age: Both can affect kidney handling of water and interpretation

## Accuracy and limitations

Specific gravity is useful as a quick estimate, but it is not a direct measure of every dissolved particle in urine.

Dipsticks mainly respond to electrically charged particles. They may miss the effect of substances that do not carry an electrical charge. Very alkaline urine and high protein levels can also interfere with some dipstick results.

Refractometers measure density more directly, but large molecules such as glucose, protein, imaging contrast, and mannitol can produce a result that appears more concentrated than the urine's water balance would suggest.

This means the test can appear abnormal when kidney concentration is working normally. It

can also look acceptable even when the kidneys do not respond normally under specific conditions.

Urine osmolality is often the better test when an accurate measurement of dissolved particles is needed. Investigating excessive thirst or urination may also require blood sodium, blood osmolality, urine volume, and repeated urine measurements. Water-deprivation testing should only be performed under medical supervision because it can cause unsafe fluid and sodium changes.

## Risks and complications

Providing a urine sample is painless and has no significant physical risk. A catheter sample may cause temporary discomfort and has separate risks that should be explained before collection.

## What happens next

A result that is slightly outside the laboratory range may only require routine follow-up. Your healthcare professional may repeat the test using a first-morning sample or review how much you drank, recent exercise, medicines, and any fluids you received.

Further testing may include urine osmolality, blood electrolytes such as sodium, kidney-function tests, or measurement of urine produced over a set period. These tests help show whether the result reflects normal hydration changes or needs further assessment.

Seek prompt medical advice if you are producing unusually large or very small amounts of urine, cannot keep fluids down, or have ongoing intense thirst.

Confusion, a seizure, fainting, severe weakness, or difficulty waking can occur with serious fluid or sodium disturbances. These symptoms need urgent or emergency assessment rather than waiting for a routine test review.

## Common questions

Can I drink coffee before the test?

Usually, yes. Fasting is not normally required. Coffee can increase urination in some people, so avoid drinking much more than usual just before the sample.

Can I drink water beforehand?

You can drink normally. Do not force yourself to drink a large amount, because this may dilute

the sample. Do not restrict water unless you have specific medical instructions.

Does the time of day matter?

It can. First-morning urine is often more concentrated than urine collected later. Use the collection time requested, especially when a previous result is being repeated.

Can I exercise before the test?

Gentle activity is unlikely to matter. Strenuous exercise can cause sweating and temporary fluid loss, which may concentrate urine. Follow any instructions to avoid exercise before a planned assessment.

Will my medicines affect the result?

Some can, especially diuretics and medicines that affect kidney or hormone control of water. Do not stop prescribed medicine unless you have been told to do so. Provide an up-to-date medicine and supplement list.

Can this test diagnose dehydration?

Not by itself. Concentrated urine may support an assessment of dehydration, but glucose, protein, contrast dye, medicines, and collection timing can produce a similar result. Symptoms, examination findings, fluid history, and sometimes blood tests are also considered.

## Sources

- MedlinePlus Medical Test: Urinalysis
- National Institute of Diabetes and Digestive and Kidney Diseases: Diabetes Insipidus Tests and Diagnosis
- American Family Physician: Urinalysis-A Comprehensive Review
- Merck Manual Professional Edition: Evaluation of the Renal Patient
- NCBI Bookshelf, StatPearls: Urinalysis