TEST

Kidney function tests

Kidney function tests use blood and urine samples to assess kidney filtration and look for kidney damage.

WHAT IT MEASURES
Blood waste levels, estimated filtration, and urine protein

SAMPLE
Blood and urine

FASTING NEEDED?
No, unless other ordered tests require fasting

HOW LONG IT TAKES
Usually 5-10 minutes

RESULTS IN
Usually 1-2 days; timing varies by laboratory

USED FOR
Screening, diagnosis, and monitoring

MAIN LIMITATION
Creatinine changes with muscle mass, diet, medicines, and hydration

Overview

Kidney function tests are a group of blood and urine tests. They show how well your kidneys filter blood and whether substances such as protein are leaking into your urine.

A common blood test measures creatinine , a waste product made by muscles. The laboratory uses this result, along with information such as your age and sex, to calculate an estimated glomerular filtration rate , or eGFR . This estimates how much blood your kidneys filter each minute.

A urine test may measure albumin , a blood protein that normally stays in the bloodstream. The result is often reported as a urine albumin-to-creatinine ratio, or ACR . This ratio helps account for how concentrated or diluted the urine is.

Other tests may include:

No single test provides a complete picture. Blood filtration results and urine albumin results give different but complementary information.

- Urea or blood urea nitrogen: another waste product in the blood
- Electrolytes: salts such as sodium and potassium
- Urinalysis: checks for blood, protein, glucose, infection markers, and other substances
- Cystatin C: an alternative blood marker used when creatinine-based estimates may be unreliable

Why the test is ordered

Kidney function tests may be ordered to look for kidney problems before symptoms develop. They can also help investigate symptoms, monitor an existing condition, or check whether a medicine is affecting your kidneys.

Testing may be used to:

An abnormal result does not always mean you have long-term kidney disease. Temporary illness, dehydration, medicines, recent exercise, and other factors can change the numbers.

- Assess kidney health in people with diabetes or high blood pressure
- Investigate swelling, changes in urination, blood in the urine, or unexplained tiredness
- Check kidney function during an acute illness
- Monitor known kidney disease
- Guide the safe use or dose of certain medicines
- Check kidney function before some scans, procedures, or treatments

Who should have the test

Testing is often considered when you have a condition that can affect the kidneys, such as diabetes, high blood pressure, heart or blood vessel disease, or a previous episode of acute kidney injury.

You may also be offered testing if you have a family history of kidney failure or a condition known to involve the kidneys. Some medicines require kidney monitoring because the kidneys remove them from the body or because they can affect kidney function.

How often testing is needed depends on your health, previous results, medicines, age, pregnancy status, and local clinical guidance. Routine testing is not identical for everyone.

How to prepare

Most kidney blood and urine tests do not require fasting. If other blood tests are being collected at the same appointment, you may be asked not to eat beforehand. Follow the instructions provided with your appointment.

Drink your usual amount of fluid. Being dehydrated can raise creatinine and urea, while drinking an unusually large amount can dilute a urine sample.

Tell the healthcare professional about prescription medicines, over-the-counter products, and supplements. Do not stop a medicine unless you have been specifically told to do so.

A first-morning urine sample may be preferred for ACR because it is less affected by activity and fluid intake. If that is not practical, a sample collected at another time can still be useful. Avoid collecting during menstrual bleeding if possible, as blood may affect the result.

What happens during the test

For the blood test, a healthcare professional places a needle into a vein, usually in your arm. A small amount of blood is collected into one or more tubes. The blood draw normally takes a few minutes.

For a urine test, you will usually be given a clean container and asked to collect a sample. You may be told to collect urine from the middle of the stream rather than at the start. This reduces contamination from skin or genital secretions.

Some investigations use a timed urine collection, often over 24 hours. You must collect all urine during the stated period because missed samples can make the result inaccurate.

Understanding your results

Results must be interpreted together rather than one number at a time. Reference ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, and clinical context.

A higher blood creatinine level can suggest reduced kidney filtration, but the meaning depends partly on muscle mass and whether the result has changed from your usual level. A sudden change may be more important than a stable result.

The eGFR is an estimate, not a direct measurement. A lower result generally suggests less filtration. However, one reduced eGFR does not by itself establish chronic kidney disease. Clinicians usually consider whether the change is recent and whether abnormal findings

persist over time.

Urine ACR shows whether albumin is leaking into the urine. An increased result may indicate kidney damage even when eGFR is still within the laboratory's expected range. A raised ACR is often repeated because exercise, infection, fever, menstrual blood, or temporary changes in blood sugar or blood pressure can affect it.

Urea, potassium, sodium, bicarbonate, and urinalysis findings can add context. Your results are best compared with earlier tests and considered alongside your health, examination, and medicines.

What affects the results

Creatinine is influenced by more than kidney filtration. A muscular person may have a higher level, while someone with low muscle mass may have a deceptively low level. This can make creatinine-based eGFR look lower or higher than the person's true filtration.

Recent cooked meat or creatine supplements can temporarily raise creatinine. Strenuous exercise can also increase it. Dehydration may raise creatinine and urea without indicating permanent kidney damage.

Medicines matter. Trimethoprim and cimetidine can raise blood creatinine by changing how the kidneys handle it, without necessarily reducing actual filtration. Anti-inflammatory medicines such as ibuprofen can genuinely reduce kidney blood flow in some circumstances. Diuretics like furosemide or hydrochlorothiazide , blood-pressure medicines, and other treatments may also change results.

Pregnancy changes kidney filtration and makes standard eGFR equations unreliable. Age and unusual body size can also reduce accuracy. A recent amputation, severe muscle loss, paralysis, malnutrition, or bodybuilding may make creatinine less representative.

Urine albumin can rise temporarily after vigorous exercise, fever, urinary infection, acute illness, menstrual contamination, or marked increases in blood pressure or blood glucose. A very diluted or concentrated sample may also affect urine measurements, although ACR reduces this problem.

Accuracy and limitations

Creatinine-based eGFR is useful for routine assessment, but it may miss early kidney damage because filtration can remain relatively well preserved. Urine ACR may find damage that an eGFR alone does not detect.

The estimate can report reduced filtration when true kidney function is better, especially in people with unusually high muscle mass. It can also appear reassuring when true function is lower, particularly in people with very low muscle mass.

Cystatin C can provide another estimate when creatinine is likely to be misleading or when confirmation would change a decision. It also has limitations: inflammation, thyroid disease, steroid treatment, and other factors may influence it.

More direct filtration measurements using injected markers are available in specialist settings. They may be more appropriate when a highly accurate measurement is needed, but they are more complex than routine testing.

A single abnormal urine or blood result may reflect a temporary change. Repeating the test helps show whether it persists. Kidney imaging or other tests may be needed when the concern involves kidney structure, stones, blockage, or blood in the urine.

Risks and complications

A blood draw may cause brief discomfort, a small bruise, or light-headedness. Serious complications are uncommon.

Providing a urine sample has no physical risk. The main concern is an incomplete, contaminated, or incorrectly timed collection, which may require the test to be repeated.

What happens next

If results are mildly abnormal and you otherwise feel well, routine follow-up may include repeating the blood or urine test, reviewing medicines, checking blood pressure, or arranging further tests. The timing depends on the degree of change, previous results, and your overall health.

A clinician may consider cystatin C, kidney imaging, or referral to a kidney specialist if results are persistent, worsening, difficult to interpret, or accompanied by other concerning findings.

Seek urgent medical advice if you develop a major reduction in urination, worsening swelling, persistent vomiting, new confusion, severe weakness, or shortness of breath.

Call emergency services for severe breathing difficulty, collapse, chest pain, or new loss of consciousness. These symptoms have many possible causes and cannot be interpreted from a kidney test alone.

Common questions

Can I drink coffee before kidney function tests?

Usually, but water is the safest choice. If you are fasting for other tests, coffee may not be allowed. Avoid drinking much more or less than usual.

Does the time of day matter?

Blood creatinine testing can usually be done at any time. A first-morning urine sample is often preferred for ACR because it is less affected by activity and fluid intake.

Can I exercise beforehand?

Avoid unusually strenuous exercise before testing if possible. Hard exercise can temporarily increase creatinine and urine albumin, making results harder to interpret.

Do I need to stop my medicines?

No, unless you receive specific instructions. Bring an up-to-date medicine and supplement list because several products can affect kidney function or the reported numbers.

Why do I need both blood and urine tests?

They measure different features. Blood tests estimate filtration, while urine tests can identify protein leakage or other signs of damage.

What if only one result is abnormal?

A single result may be temporary or misleading. If you are otherwise well, repeat testing and comparison with previous results are often more informative than one isolated number.

Sources

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- UK Kidney Association: Measurement of kidney function
- National Kidney Foundation: Estimated Glomerular Filtration Rate
- National Kidney Foundation: Urine Albumin-Creatinine Ratio