TEST

Glomerular filtration rate

Glomerular filtration rate estimates how well your kidneys filter waste from your blood.

WHAT IT MEASURES
How quickly the kidneys filter waste from blood

SAMPLE
Blood

FASTING NEEDED?
No, unless required for other tests

HOW LONG IT TAKES
Usually under five minutes for a blood draw

RESULTS IN
Same day to several days, varying by laboratory

USED FOR
Screening, diagnosis support, and kidney function monitoring

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

Overview

Glomerular filtration rate, or GFR, describes how much blood your kidneys filter over time. The glomeruli are tiny filters inside the kidneys. They remove waste and excess water while keeping blood cells and most proteins in the bloodstream.

GFR is rarely measured directly during routine care. Instead, laboratories usually calculate an estimated glomerular filtration rate , called eGFR, from a blood creatinine result. Creatinine is a waste product produced by normal muscle activity.

The calculation also uses factors such as age and sex. Current recommended equations do not use race. Your result is usually reported in millilitres per minute per 1.73 square metres of body surface area, written as mL/min/1.73 m^2.

Another blood marker, called cystatin C , can be used to estimate GFR. A calculation combining creatinine and cystatin C may be helpful when a creatinine-based result could be misleading.

A measured GFR is a more involved test. It follows how quickly the kidneys clear a carefully selected tracer substance from the blood. It is mainly used when a particularly accurate result is needed.

Why the test is ordered

An eGFR helps assess how well your kidneys are filtering. It may be ordered as part of a general health check or because another test, symptom, condition, or medicine raises questions about kidney function.

Common reasons include:

The result is usually considered with a urine albumin-to-creatinine ratio. This urine test looks for albumin, a blood protein that can leak into urine when the kidney filters are damaged.

- Screening people with risk factors for kidney disease
- Investigating an abnormal creatinine result
- Monitoring known kidney disease
- Checking kidney function before or during certain treatments
- Helping guide the dose of medicines cleared through the kidneys
- Assessing kidney function during an acute illness

Who should have the test

You may be offered an eGFR if you have diabetes, high blood pressure, cardiovascular disease, previous kidney problems, or a family history of kidney disease. It may also be checked if you take a medicine that can affect the kidneys or needs dose adjustment when kidney function changes.

Testing may be appropriate if you have blood or protein in your urine, swelling that has no clear explanation, changes in urination, or an abnormal kidney scan. These findings have many possible causes and do not confirm kidney disease by themselves.

How often testing is needed depends on your health, previous results, medicines, and reason for testing. A single eGFR result is not usually enough to diagnose chronic kidney disease.

How to prepare

Routine creatinine and eGFR testing usually needs no special preparation. You can normally eat and drink as usual unless you are having other tests that require fasting.

Tell the healthcare professional arranging the test about prescription medicines, non-prescription products, and supplements. Do not stop a medicine unless you have been

specifically advised to do so.

A large cooked-meat meal, creatine supplements, or strenuous exercise shortly before the blood draw can temporarily raise creatinine. If precise assessment is important, you may be given instructions about avoiding these beforehand.

Measured GFR tests need more preparation. The testing centre may give instructions about food, fluids, medicines, and arrival time.

What happens during the test

For a routine eGFR, a healthcare professional takes blood from a vein, usually in your arm. The laboratory measures creatinine and automatically calculates eGFR. Some laboratories can also calculate an estimate using cystatin C.

A blood draw usually takes only a few minutes. No urine sample is needed to calculate eGFR, although a urine test is often ordered at the same time to look for albumin or other abnormalities.

For measured GFR, a tracer is injected into a vein. Blood samples are then collected at set times to see how quickly the tracer leaves your bloodstream. The appointment may take several hours, depending on the method.

A timed urine creatinine clearance is sometimes used, but it is not the same as measured GFR. It requires collecting all urine produced over a set period, often 24 hours.

Understanding your results

A higher eGFR generally means better filtration. A lower result suggests that the kidneys are filtering more slowly, but it does not show the cause.

Interpretation varies by laboratory, age, sex, pregnancy status, medicines, and clinical context. Results are also assessed alongside previous eGFR values, blood tests, urine findings, blood pressure, symptoms, and medical history.

An eGFR below 60 mL/min/1.73 m^2 that remains present for at least three months can meet one criterion for chronic kidney disease. Kidney disease can also be present with a higher eGFR if there are other signs of kidney damage, such as persistent albumin in the urine.

One unexpectedly low result does not necessarily mean that you have chronic kidney disease. Kidney function may change temporarily during dehydration, infection, urinary blockage, or another acute illness. The result may also be misleading because of factors unrelated to

filtration.

Some laboratories report higher results simply as "above 90" because creatinine-based estimates are less precise when kidney function is near normal.

What affects the results

Creatinine does not come only from kidney filtration. Anything that changes creatinine production or handling can alter eGFR without an equivalent change in kidney function.

Important influences include:

Cystatin C is less influenced by muscle mass, but it has its own limitations. Steroid treatment, thyroid conditions, inflammation, smoking, and body composition may affect it.

Incomplete urine collection can make a timed creatinine clearance wrong even when the laboratory measurement itself is accurate.

- Muscle mass: Very muscular people may have a lower creatinine-based eGFR. Frailty, amputation, paralysis, or severe muscle loss may make it appear higher.
- Diet and supplements: Cooked meat and creatine supplements can temporarily raise creatinine.
- Recent exercise: Strenuous activity or muscle injury can increase creatinine.
- Medicines: Trimethoprim, cimetidine, dolutegravir, and cobicistat can raise blood creatinine by reducing its movement into urine, without necessarily reducing filtration.
- Rapid kidney changes: eGFR equations assume creatinine is fairly stable. During acute kidney injury, the estimate may lag behind the actual change.
- Pregnancy: Normal kidney filtration changes during pregnancy, and standard eGFR equations are not well validated for pregnant people.
- Age and sex: These are included in common equations, but individual differences remain.
- Laboratory methods: Small differences in creatinine measurement and the equation used can affect the result.

Accuracy and limitations

Creatinine-based eGFR is useful for routine care, but it is an estimate rather than a direct measurement. The reported number should not be treated as exact.

The test can suggest reduced filtration when filtration is actually adequate. This can happen in

someone with high muscle mass, after a large meat meal, following strenuous exercise, or while taking a medicine that raises creatinine without harming filtration.

It can also miss reduced filtration by giving a reassuring result when kidney function is lower than it appears. This is more likely in someone with very low muscle mass, frailty, an amputation, or severe long-term illness.

Using both creatinine and cystatin C generally provides a more accurate estimate than either marker alone. A measured GFR may be preferable when precision could change an important decision, such as kidney donation assessment or dosing certain medicines.

Timed creatinine clearance is vulnerable to missed or extra urine and usually overestimates true GFR because the kidneys release some creatinine directly into urine.

Risks and complications

For routine eGFR testing, the only procedure is a blood draw. You may have brief discomfort, a small bruise, or feel faint.

Measured GFR involves an injected tracer and repeated blood samples. Reactions to the tracer are uncommon, but the testing service should explain the specific risks before the procedure.

What happens next

A result that is mildly different from your previous results often leads to routine follow-up rather than urgent treatment. This may include repeating creatinine and eGFR, checking cystatin C, testing urine for albumin, reviewing medicines, or assessing blood pressure.

A sustained change may lead to further blood tests, urine tests, imaging, or referral to a kidney specialist. Treatment decisions are based on the cause, the pattern over time, urine findings, and your overall health-not on eGFR alone.

Seek urgent medical advice if reduced urine output occurs with vomiting, severe diarrhoea, worsening swelling, breathlessness, confusion, or significant illness. Seek emergency care for severe breathing difficulty, chest pain, collapse, or inability to wake normally. These symptoms are urgent because of the illness they may represent, not because of an eGFR number by itself.

Common questions

Can I drink coffee before an eGFR test?

Usually, yes. Routine eGFR testing does not require fasting. Follow any separate instructions if other blood tests are being taken at the same appointment.

Does the time of day matter?

Usually not for routine monitoring. If your healthcare team is comparing closely spaced results or arranging measured GFR, follow the timing instructions provided.

Can I exercise beforehand?

Gentle activity is unlikely to matter. Strenuous exercise can raise creatinine temporarily, so avoiding a hard workout before testing may give a more representative result.

Is eGFR the same as a creatinine test?

No. Creatinine is measured in the blood. eGFR is calculated from that result together with details such as age and sex.

Do I need to collect urine?

Not for a standard eGFR. A separate urine albumin-to-creatinine ratio is often useful because filtration and urine protein provide different information about kidney health.

Why did my eGFR change between tests?

Small changes can reflect hydration, meals, exercise, medicines, illness, normal biological variation, or laboratory variation. The trend over time is usually more informative than one small change.

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