TEST

Renal scan

A renal scan uses a small radioactive tracer to assess kidney function and urine drainage

WHAT IT MEASURES
Kidney function, blood flow, urine drainage, or kidney tissue

SAMPLE
None

FASTING NEEDED?
No unless your imaging department gives special instructions

HOW LONG IT TAKES
Thirty minutes to several hours, based on scan type

RESULTS IN
Usually several days; varies by imaging service and laboratory

USED FOR
Diagnosis and monitoring of kidney function, drainage, and scarring

MAIN LIMITATION
Hydration, low kidney function, and technique can mislead results

Overview

A renal scan is a nuclear medicine imaging test. It shows how your kidneys take up and remove a small amount of radioactive material called a tracer .

After the tracer is injected into a vein, a special camera detects it as it moves through your kidneys. The scan may assess blood flow, compare the function of your two kidneys, or show how well urine drains into the bladder.

The exact test depends on the question being asked. Common forms include:

A renal scan is different from an ultrasound, CT scan, or MRI. Those tests usually provide more detailed pictures of kidney structure. A renal scan focuses mainly on how the kidneys work.

- A MAG3 or DTPA renogram , which follows kidney function and urine drainage over time
- A diuretic like furosemide or hydrochlorothiazide renogram , which uses a medicine that increases urine flow to investigate possible blockage
- A DMSA scan , which gives detailed images of working kidney tissue and may show areas of damage or scarring

- An ACE inhibitor like lisinopril or ramipril renal scan , which assesses whether narrowing of a kidney artery may be affecting function

Why the test is ordered

A renal scan may be ordered to investigate or monitor:

The scan may also help determine whether an enlarged urine-collecting system is draining slowly because of a true blockage or because it is naturally wide.

It is not commonly used as a general screening test in people without a specific kidney concern.

- Possible blockage between a kidney and the bladder
- Swelling of a kidney caused by backed-up urine
- Differences in function between the right and left kidneys
- Kidney function before or after surgery
- The function and drainage of a transplanted kidney
- Areas of kidney tissue damaged by infection or another condition
- Possible reduced blood flow through a kidney artery

Who should have the test

You may have a renal scan if another test, such as an ultrasound, has found an abnormality that needs further assessment. It may also be used when blood tests, symptoms, surgery, or a known urinary tract condition raise questions about kidney function or drainage.

Renal scans can be performed in adults and children. The tracer amount and imaging method are adjusted for the person and the reason for testing.

Tell the imaging department before the appointment if you are pregnant, could be pregnant, or are breastfeeding. The team can assess whether the scan should proceed and provide specific safety instructions.

How to prepare

Follow the instructions from your nuclear medicine department because preparation differs by

scan type.

You will usually be asked to drink water before the test. Good hydration helps the kidneys process the tracer and makes drainage easier to interpret. You may also be asked to empty your bladder shortly before imaging.

Most renal scans do not require fasting. An ACE inhibitor scan or a test involving certain medicines may have different instructions.

Give the department an up-to-date list of your medicines. Diuretics, also called water tablets, and blood pressure medicines such as ACE inhibitors or angiotensin receptor blockers can affect some scan protocols. Do not stop a prescribed medicine unless the department specifically tells you to do so.

Tell the team about recent nuclear medicine tests, kidney or urinary surgery, stents, drainage tubes, difficulty emptying your bladder, or severe limits on how much fluid you can drink.

Wear comfortable clothing. Metal objects near the abdomen or back may need to be removed.

What happens during the test

A small intravenous line, or IV, is placed into a vein in your hand or arm. The radioactive tracer is injected through it. The injection usually feels similar to a blood test.

For a renogram, you lie on an imaging table while a gamma camera is positioned near your back or abdomen. The camera does not produce radiation or enclose your whole body. It detects the tracer passing through your kidneys.

Images are taken continuously, often for about 30 to 60 minutes. You need to remain as still as possible.

For a diuretic renogram, you may receive furosemide, a medicine that makes the kidneys produce more urine. It may be given before or during imaging. You are likely to feel a strong need to urinate afterward.

For a DMSA scan, images are usually taken a few hours after the injection so the tracer has time to collect in functioning kidney tissue. The imaging itself may take around 30 to 60 minutes.

A bladder catheter is sometimes needed, particularly when bladder emptying could affect the result. This is not required for most people.

Understanding your results

A nuclear medicine specialist reviews the images and computer-generated graphs. The report is sent to the healthcare professional who requested the test.

A renogram may describe:

A DMSA scan describes how evenly the tracer is distributed through the working outer tissue of each kidney. An area with reduced uptake is called a cortical defect . This finding can have several causes and must be interpreted with your history and other tests.

Slow drainage does not always mean there is a physical blockage. A very enlarged collecting system, a full bladder, dehydration, or poor overall kidney function can also delay the tracer.

There is no single universal normal range for every renal scan measurement. Methods and interpretation vary by imaging service, laboratory, age, sex, pregnancy status, medicines, kidney function, scan protocol, and clinical context.

- How quickly each kidney takes up the tracer
- The share of total function provided by each kidney
- How quickly the tracer passes into the bladder
- Whether a diuretic improves drainage
- Whether blood flow or function appears reduced

What affects the results

Several factors can change the images or graphs even when the equipment is working correctly.

Hydration matters. Dehydration may reduce tracer delivery to the kidneys and make drainage look slower. Drinking far more or less than instructed can also change bladder filling.

A full bladder can delay drainage. If you cannot empty your bladder completely, pressure may slow urine leaving the kidneys. A catheter may sometimes be used to reduce this effect.

Low kidney function can make the scan harder to interpret. A poorly functioning kidney may take up little tracer or respond weakly to a diuretic. This can make it difficult to separate low function from blockage.

Medicines can alter the test. Diuretics change urine production. ACE inhibitors and related blood pressure medicines affect blood flow within the kidneys and are especially important for ACE inhibitor scans.

Recent procedures can change drainage. Surgery, a ureteric stent, a nephrostomy tube, or a bladder catheter may alter the tracer's route.

Movement can blur the images. Changing position may also make one kidney appear to have a different tracer level.

Injection problems can distort the graphs. If some tracer leaks into tissue around the IV instead of entering the bloodstream promptly, kidney uptake may appear delayed.

Age, body size, kidney position, pregnancy-related changes, and a recent nuclear medicine test may also influence how the scan is performed or interpreted.

Accuracy and limitations

Accuracy depends on the tracer, protocol, reason for testing, kidney function, and quality of preparation. There is no single percentage showing how often every type of renal scan is correct.

A diuretic renogram can sometimes suggest blockage when none is present. This is more likely with dehydration, a full bladder, poor kidney function, or a greatly enlarged but unobstructed collecting system.

It can also miss a problem. An intermittent blockage may not occur during the scan. Movement, an incomplete injection, or an inadequate response to the diuretic can hide or mimic abnormal drainage.

A DMSA scan can find areas that take up less tracer, but the appearance alone may not reliably distinguish a recent kidney infection from permanent scarring. Timing and other clinical information matter.

Renal ultrasound, CT, or MRI is usually better for detailed anatomy, stones, or masses. Blood and urine tests are better for assessing overall filtration, protein loss, or infection. Sometimes more than one test is needed because each answers a different question.

Risks and complications

The IV may cause brief discomfort, bruising, or light-headedness. Infection at the injection site is uncommon.

The tracer exposes you to a small amount of ionising radiation. It usually leaves the body through urine. Allergic reactions to renal tracers are rare.

Furosemide can cause urinary urgency, temporary dizziness, or dehydration. ACE inhibitor testing can lower blood pressure. A catheter, if needed, may cause discomfort and carries a small risk of urinary infection.

Pregnancy and breastfeeding require individual planning because of radiation exposure. Follow the nuclear medicine department's instructions about fluids, toilet hygiene, and close contact with others after the test.

What happens next

You can usually return to normal activities and eat normally after the scan. Drinking fluids and urinating regularly may help remove the tracer, unless you have been told to limit fluids.

The result is normally discussed at routine follow-up with the professional who ordered the test. Depending on the findings, the next step may be observation, another imaging test, blood or urine testing, or referral to a kidney or urinary tract specialist.

Contact the imaging department or your usual healthcare service if increasing redness, swelling, or pain develops around the IV site.

Seek urgent medical help for difficulty breathing, facial or throat swelling, collapse, or severe persistent dizziness after the test. These reactions are unusual but need prompt assessment.

Common questions

Can I drink coffee before a renal scan?

Usually, but water is often preferred because hydration is important. Coffee can increase urine production. Follow your appointment instructions if they limit caffeine or require fasting.

Does the time of day matter?

Usually not. Timing may matter if the scan must be coordinated with meals, medicines, another procedure, or a child's sleep schedule.

Can I exercise beforehand?

Ordinary activity is generally acceptable. Avoid becoming dehydrated through prolonged or intense exercise before the appointment.

Can I drive home afterward?

Most people can drive after a standard renal scan. Arrange help if you receive a sedative, feel faint, or are told that a medicine used during the test may affect your blood pressure.

Can I be around children or someone who is pregnant?

The tracer gives off radiation for a limited time. The department may recommend temporary limits on prolonged close contact, particularly with babies, young children, or pregnant people.

Follow the instructions for your specific tracer and dose.

Will my urine be radioactive?

A small amount of tracer leaves through urine. You may be advised to flush carefully, wash your hands well, and clean any spills for a stated period after the scan.

Sources

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