TEST

Renal perfusion scintiscan

A renal perfusion scintiscan uses a radioactive tracer and camera to assess blood flow, function, and urine drainage in the kidneys.

WHAT IT MEASURES
Blood flow, function, and urine drainage from each kidney

SAMPLE
None; gamma-camera imaging after an injected radioactive tracer

FASTING NEEDED?
Usually no; special medicine-based studies may require it

HOW LONG IT TAKES
Usually 30-60 minutes; some protocols take longer

RESULTS IN
Often 1-3 days; varies by laboratory and imaging service

USED FOR
Evaluating kidney blood flow, function, blockage, or transplant perfusion

MAIN LIMITATION
Poor kidney function can make drainage appear delayed

Overview

A renal perfusion scintiscan is a nuclear medicine imaging test. It is also called renal scintigraphy, a renal perfusion scan, or a radionuclide renogram.

The test uses a small amount of radioactive material called a tracer. The tracer is injected into a vein and travels through the bloodstream to the kidneys. A gamma camera detects the tracer and takes a series of images.

The first images show how quickly blood reaches the kidneys. Later images show how each kidney takes up the tracer and passes it into the urine. This can provide information about blood flow, kidney function, and urine drainage.

The test does not use iodine-based contrast dye. It also does not give the same detailed pictures of kidney structure as an ultrasound, CT scan, or MRI.

Why the test is ordered

A renal perfusion scintiscan may be ordered to find out how well the kidneys are working separately. Standard blood tests usually measure the combined function of both kidneys.

The scan may help assess:

Sometimes a diuretic such as furosemide is given during the scan. A diuretic like furosemide or hydrochlorothiazide increases urine production and can help show whether slow drainage is caused by a physical blockage or simply by a widened collecting system.

A specially designed study using a medicine that affects blood pressure may occasionally be used when reduced blood flow through a kidney artery is suspected. This is not part of every renal perfusion scan.

- Reduced blood flow to one or both kidneys
- A possible blockage in urine drainage
- Swelling of the kidney, called hydronephrosis
- Kidney function before or after surgery
- Blood flow and function in a transplanted kidney
- Differences in function between the two kidneys
- Kidney drainage after an injury or urinary tract procedure

Who should have the test

This test is not normally used as a general screening test for people without symptoms or known kidney concerns. It is ordered when the result could answer a specific question about kidney blood flow, function, or drainage.

It may be appropriate for adults or children. The exact method is adjusted for age, body size, kidney function, and the reason for testing.

Tell the imaging team before the scan if you are pregnant, may be pregnant, or are breastfeeding. The team can assess whether the test should go ahead and whether any temporary breastfeeding precautions are needed.

Also tell them if you have difficulty lying still, cannot empty your bladder, have a urinary catheter, or have recently had kidney or urinary tract surgery.

How to prepare

Most standard renal perfusion scans do not require fasting. However, preparation differs for

scans that include certain medicines. Follow the instructions from your nuclear medicine department rather than stopping food or medicines yourself.

You will usually be encouraged to drink water before the scan. Good hydration helps the tracer pass through the kidneys and makes drainage easier to interpret. The department may give you a specific amount and timing.

Provide an up-to-date list of your medicines. Diuretics, blood pressure medicines, and medicines that affect kidney function can matter. Do not stop any medicine unless the team arranging the test gives you clear instructions.

Wear comfortable clothing and remove metal objects near the area being scanned. You may be asked to empty your bladder shortly before imaging.

What happens during the test

A member of the nuclear medicine team places a small intravenous line, or IV, into a vein in your hand or arm. You then lie on an imaging table with the gamma camera positioned near your back or abdomen.

The tracer is injected through the IV. Imaging usually starts at once because the first seconds show blood arriving at the kidneys. The camera continues taking pictures as the kidneys collect and release the tracer.

You need to remain as still as possible, but the camera does not enclose your whole body. The test itself should not be painful, although lying still may be uncomfortable.

Depending on the reason for the scan, you may receive a diuretic to increase urine flow. You may need to urinate partway through or immediately after the test. Some protocols require extra images or blood pressure checks.

Most appointments take about 30 to 60 minutes. A more complex study can take longer.

Understanding your results

A nuclear medicine specialist reviews the images and computer-generated graphs. The report usually considers several parts of kidney function.

Perfusion describes how quickly and evenly blood reaches each kidney. Reduced tracer arrival may reflect reduced blood flow, but it can also occur when overall circulation or kidney function is poor.

Uptake describes how well kidney tissue removes the tracer from the blood. The report may

estimate the share of total function provided by each kidney. This is often called split or differential renal function.

Drainage describes how the tracer moves from the kidneys into the ureters and bladder. Delayed drainage may suggest blockage, but it can also happen with dehydration, reduced kidney function, or a large collecting system.

There is no single result that applies to every person or every scanning method. Expected findings and interpretation vary by laboratory, age, sex, pregnancy status, medicines, tracer, and clinical context. The scan should be interpreted alongside symptoms, blood and urine tests, and other imaging.

What affects the results

Several factors can change the images without there being a problem with the camera or laboratory.

Dehydration can reduce urine flow and make drainage appear slower. A full bladder can create back pressure and delay drainage from the kidneys. You may therefore be asked to drink water and empty your bladder at specific times.

Poor kidney function can cause weak tracer uptake and slow clearance. This can make it difficult to distinguish a true blockage from generally reduced function.

Medicines can also affect the result. Diuretics change urine flow, while some blood pressure medicines alter blood flow within the kidneys. The effect is especially important in scans specifically designed to investigate kidney artery narrowing.

Other influences include:

Tell the imaging team about these factors. They may change how the scan is performed or interpreted.

- Movement during image collection
- Tracer leaking into tissue around the IV
- Incorrect timing between the tracer, diuretic, and images
- A urinary catheter, stent, or nephrostomy tube
- Recent kidney or urinary tract surgery
- Unusual kidney position, shape, or size
- Difficulty emptying the bladder

Accuracy and limitations

A renal perfusion scintiscan provides useful information about how the kidneys work, but it does not give a complete diagnosis by itself.

The test can sometimes suggest blockage when no fixed blockage is present. This may happen with dehydration, a full bladder, poor kidney function, or a greatly enlarged urine-collecting system.

It can also miss a problem. Intermittent blockage may not be present during the scan. Mild or similar changes affecting both kidneys can be harder to recognize because the test often compares one kidney with the other.

Accuracy differs according to the tracer, imaging protocol, kidney function, medicine timing, and question being asked. There is no single reliable percentage for all renal perfusion scans.

An ultrasound is often better for showing kidney size, swelling, and structural changes. CT or MRI may be better for finding stones, masses, or detailed blood-vessel problems. A different nuclear medicine scan may be chosen when the main question concerns kidney scarring rather than perfusion and drainage.

Risks and complications

The IV may cause brief discomfort, a small bruise, or light-headedness. These effects usually settle quickly.

The tracer exposes you to a small amount of ionising radiation. It leaves the body mainly through urine. Drinking fluids and urinating regularly after the scan may help clear it, if you have not been told to limit fluids.

Allergic reactions to renal tracers are uncommon. A diuretic may cause urgent urination, temporary dizziness, or a change in blood pressure.

Seek emergency help for trouble breathing, swelling of the face or throat, or collapse after leaving the department. Mild bruising at the IV site can usually be monitored, but increasing redness, swelling, or pain should be discussed with a healthcare professional.

What happens next

A specialist prepares a report for the healthcare professional who ordered the scan. Routine results are usually reviewed at a follow-up appointment or communicated through the service

that arranged the test.

The next step may be no further testing, continued monitoring, or another test to clarify the findings. Ultrasound, CT, MRI, or blood and urine tests may be recommended depending on the original concern.

Do not wait for a routine follow-up if you develop severe new side or abdominal pain, cannot pass urine, faint, or have signs of a serious allergic reaction. Seek urgent or emergency care based on the severity of your symptoms.

Common questions

Can I drink coffee before the scan?

Fasting is usually unnecessary, but water is generally preferred because caffeine can affect urine production. Follow the instructions from your imaging department, especially if the scan includes a medicine.

Does the time of day matter?

Usually not. Hydration, bladder emptying, and the timing of any medicines are more important than the time on the clock.

Can I exercise beforehand?

Ordinary activity is unlikely to affect a standard scan. Avoid becoming dehydrated through strenuous exercise, and follow any special instructions if your scan involves blood pressure testing.

Should I take my usual medicines?

Usually, but some diuretics or blood pressure medicines may need special timing. Do not stop prescribed medicines unless the team arranging the scan tells you to do so.

Will the injection make me feel radioactive?

No. You cannot feel the tracer, and you do not become dangerous to others in ordinary circumstances. Follow any short-term instructions about close contact, pregnancy, or breastfeeding given by the nuclear medicine team.

Can I drive home afterward?

Most people can drive after a standard scan. Ask the department if you receive a medicine that causes dizziness or if sedation is planned.

Sources

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