TEST

Radionuclide cystogram

A radionuclide cystogram uses a small radioactive tracer to check whether urine flows backward toward the kidneys.

WHAT IT MEASURES
Urine flowing backward from bladder toward kidneys

SAMPLE
None; nuclear medicine imaging

FASTING NEEDED?
No

HOW LONG IT TAKES
About 30-60 minutes

RESULTS IN
Usually 1-3 days; varies by laboratory

USED FOR
Diagnosis and monitoring of urinary reflux

MAIN LIMITATION
Limited detail of the bladder, urethra, and urinary anatomy

Overview

A radionuclide cystogram is a nuclear medicine imaging test. It checks for vesicoureteral reflux , often shortened to VUR. This means urine flows backward from the bladder into one or both ureters, the tubes connecting the kidneys to the bladder.

The test uses a very small amount of radioactive material, called a radiotracer. For the usual direct test, the tracer is mixed with fluid and placed into the bladder through a thin urinary catheter. A gamma camera detects the tracer as the bladder fills and empties.

The test is often used in children, particularly to monitor reflux that is already known or suspected. It exposes the bladder area to less radiation than a conventional voiding cystourethrogram, or VCUG. However, it provides less detailed pictures of the bladder and urethra.

There is also an indirect form performed after an injected kidney scan. It does not usually require a catheter, but it is suitable only in certain circumstances. This article mainly describes the more common direct radionuclide cystogram.

Why the test is ordered

A radionuclide cystogram may be ordered to find out whether urine travels backward from the bladder toward the kidneys. Reflux can happen while the bladder is filling, during urination, or both.

The test may be used to:

The test does not show every possible cause of urinary symptoms. An ultrasound, VCUG, urine test, kidney scan, or another examination may be more useful for a particular question.

- Look for reflux after certain urinary tract infections
- Monitor previously identified reflux
- Check the result of surgery or another treatment
- Investigate urinary tract dilation found on another scan
- Reduce radiation exposure when repeated reflux imaging is needed

Who should have the test

The test is most often considered for children with known or suspected urinary reflux. Adults need it less commonly.

Whether it is suitable depends on the reason for testing, previous imaging, age, urinary anatomy, and whether detailed pictures of the urethra are needed. For example, a VCUG may be preferred when the care team needs a clear view of the bladder outlet or urethra.

Tell the imaging department before the appointment if you or your child:

Pregnancy does not necessarily change whether reflux is present, but it affects decisions about radiation imaging.

- Could be pregnant or are breastfeeding
- Have fever, painful urination, or another possible urinary infection
- Recently had urinary tract surgery
- Have difficulty passing a catheter
- Have an allergy to latex, adhesive, or antiseptic products

How to prepare

Fasting is not normally required. You can usually eat, drink, and take regular medicines as usual unless the imaging department gives different instructions.

Normal fluid intake can make it easier to urinate during the test. Do not force large amounts of fluid unless specifically asked to do so.

A child may find it helpful to know that a thin tube will briefly be placed into the bladder and that a parent or caregiver can often remain nearby. Sedation is not routinely used because the person being tested usually needs to urinate during the examination.

Bring details of previous urinary imaging, surgery, infections, and medicines if the department does not already have them. Follow any instructions about antibiotics like amoxicillin or doxycycline already prescribed, but do not start or stop an antibiotic solely because of this test without medical advice.

What happens during the test

You or your child will usually change into a gown and lie on an imaging table. The skin around the urinary opening is cleaned.

A healthcare professional gently passes a thin, flexible catheter through the urethra into the bladder. The urethra is the tube through which urine leaves the body. Catheter insertion may cause brief pressure, stinging, or an urge to urinate.

The catheter is connected to fluid containing a small amount of radiotracer. The fluid flows slowly into the bladder. A gamma camera records images while the bladder fills.

When the bladder is full enough, images are taken during urination. Depending on the local procedure, the catheter may be removed before or during this stage. A final image may be taken after the bladder is empty.

The appointment commonly takes about 30 to 60 minutes. It may take longer if filling is slow or the person has difficulty urinating in the test room.

Understanding your results

A nuclear medicine specialist reviews the images and sends a report to the clinician who requested the test.

A report may say that no reflux was seen. This means the test did not show tracer moving from the bladder into a ureter during that examination.

If reflux is seen, the report may describe:

Unlike many blood tests, a radionuclide cystogram has no universal numeric reference range. Interpretation varies with the imaging method, laboratory or department, age, sex, pregnancy status, medicines, previous treatment, and clinical context.

A result showing reflux does not by itself determine what treatment is needed. The result is considered alongside urinary infections, kidney ultrasound findings, kidney function, age, symptoms, and previous imaging.

- Whether it was on the right, left, or both sides
- Whether it occurred during filling or urination
- How far the tracer travelled toward the kidney
- Whether urine remained in the bladder after urination

What affects the results

Reflux can be intermittent. It may happen during one bladder-filling cycle but not another. A negative test therefore cannot prove that reflux never occurs.

The result can also be affected by:

Hydration affects how readily someone can urinate, although it does not directly create reflux. Most medicines have little effect on a direct test, but medicines that change bladder activity may influence filling or emptying.

Kidney function has little effect on a direct radionuclide cystogram because the tracer is placed into the bladder. It matters more for an indirect test, in which tracer must pass through the kidneys after an injection. A recent nuclear medicine scan may also leave background radioactivity that affects image interpretation, so tell the department about recent imaging.

- A bladder that was not filled enough
- Being unable to urinate during imaging
- Movement while images are recorded
- Straining, distress, or unusually high bladder pressure
- Radiotracer leaking around the catheter
- Tracer contamination on clothing or skin
- Poor tracer mixing inside the bladder
- A catheter position that changes normal bladder emptying

Accuracy and limitations

Direct radionuclide cystography is good at detecting tracer that moves backward from the bladder. Continuous imaging during filling and urination can identify brief episodes of reflux that might otherwise be missed.

However, no reflux test finds every case. Intermittent reflux may not occur during the appointment, particularly if the bladder is not filled or emptied in the usual way. This can produce a negative result even when reflux sometimes happens.

Tracer on the skin, clothing, or equipment can occasionally look like reflux. Careful catheter placement, cleaning, and image review help prevent this type of incorrect positive result.

The main limitation is poor anatomical detail. The test shows where the tracer travels but does not provide the detailed pictures of the bladder, ureters, and urethra produced by a VCUG. A VCUG may be the better test when urethral anatomy or a structural blockage needs assessment.

Ultrasound is useful for showing kidney and bladder structure without radiation, but a normal ultrasound does not reliably rule out reflux. An indirect radionuclide cystogram avoids catheter insertion, but it requires adequate kidney function and bladder control and may miss reflux under some circumstances.

Risks and complications

The catheter can cause temporary discomfort, mild burning during the next few urinations, or a small amount of pink urine. Catheter-related infection or injury is uncommon.

The test uses ionizing radiation. The amount is generally low and is kept as small as reasonably possible, especially for children. The exact exposure depends on the radiotracer, equipment, age, body size, and imaging protocol.

Contact the care team promptly if there is fever, worsening pain, persistent burning, cloudy or foul-smelling urine, or bleeding that does not settle. These are follow-up concerns rather than expected test effects.

Seek urgent medical care if you or your child cannot urinate and has a painful, swollen lower abdomen. Call emergency services for severe breathing difficulty, collapse, or swelling of the face or throat, although a serious allergic reaction is very rare.

What happens next

Most people can return to normal activities immediately. Drinking normally and urinating when needed can help clear the tracer from the bladder.

Mild stinging should settle quickly. Follow any specific hygiene or radiation-safety instructions from the imaging department.

A clinician will review the report with other health information. Routine follow-up may involve observation, repeat urine or imaging tests, management of urinary infections, or referral to a kidney or urinary specialist. The result alone does not mean that surgery or medicine is required.

Common questions

Can I eat or drink coffee before the test?

Yes. Fasting is usually unnecessary, so normal food, water, and coffee are generally allowed. Follow different instructions if your imaging department provides them.

Does the time of day matter?

Usually not. The ability to fill and empty the bladder matters more than the appointment time.

Can I exercise beforehand?

Normal exercise does not usually affect a direct radionuclide cystogram. Avoid arriving dehydrated after strenuous activity because this may make urination more difficult.

Will the catheter hurt?

It may cause brief stinging, pressure, or an urge to urinate. The discomfort usually eases once the catheter is removed.

Can a parent stay with a child?

Often, yes. The department may provide protective clothing and instructions about where to stand. Someone who is pregnant may be asked not to remain in the imaging room.

How much radiation is involved?

The radiation exposure is generally low and usually lower than with a conventional VCUG. The exact amount depends on the radiotracer dose and local imaging method.

Sources

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