

Renal Ultrasound

Renal ultrasound imaging is safe, noninvasive, and does not use radiation.

This exam requires little to no special preparation. The ultrasound technologist may ask you to drink water before the exam to fill your bladder. Leave jewelry at home and wear loose, comfortable clothing. You may need to wear a gown.

What is a Renal Ultrasound?

Renal ultrasound is a noninvasive medical exam that uses sound waves to produce pictures of the kidneys and bladder. It helps doctors diagnose and treat urinary conditions. It is safe and painless. Ultrasound imaging is also known as sonography. It uses a small probe called a transducer and gel placed directly on the skin. High-frequency sound waves travel from the probe through the gel into the body. The probe collects the sound waves that bounce back. A computer uses those sound waves to create an image. Since ultrasound captures images in real-time, it can show the body's internal organs and structures moving. The images can also show blood flowing through blood vessels.

A Doppler ultrasound exam may be part of a renal ultrasound exam. Doppler ultrasound is a special ultrasound technique that looks at blood in the body. It allows the doctor to see and evaluate blood flow to your kidneys.

What are some common uses of the procedure?

Doctors order renal ultrasound to check the kidneys and bladder.

Ultrasound can help identify:

- Abnormalities in the size or location of your kidneys
- Signs of injury or damage to your kidneys, including findings of kidney infection
- *Kidney stones* (<https://www.radiologyinfo.org/en/info/stones-renal>) , *cysts* (<https://www.radiologyinfo.org/en/info/renal-cyst>) , or tumors, including if a stone is blocking your kidney from draining normally
- Problems with your bladder, including urinary retention. Urinary retention is when your bladder does not fully empty when you try and pee.

Your doctor may also use renal ultrasound to help guide putting a needle into your kidney during a biopsy.

Doppler ultrasound of the kidneys helps the doctor to see and evaluate:

- Blood flow to your kidney - including narrowing or clots in your blood vessels
- Tumors of the kidney

Your doctor may use Doppler ultrasound to evaluate high blood pressure that is not responding to medication and lifestyle changes.



How should I prepare?

Your doctor will give you instructions before the exam. You may have to drink 24 ounces of water before the exam to get better images of your bladder. They may also tell you not to eat or drink hours before the exam. Your doctor may ask you not to urinate until the exam is complete.

Wear comfortable, loose-fitting clothing. You may need to remove all clothing and jewelry in the area under examination. You may need to change into a gown for the procedure.

Ultrasound exams are sensitive to motion, and an active or crying child can prolong the exam. To ensure a smooth experience, it often helps to explain the procedure to the child before the exam. Bring books, small toys, music, or games to help distract the child and make the time pass quickly. The exam room may have a television.

What does the equipment look like?

Ultrasound machines consist of a computer console, video monitor and an attached transducer. The transducer is a small hand-held device that resembles a microphone. Some exams may use different transducers (with different capabilities) during a single exam. The transducer sends out inaudible sound waves into the body and listens for the returning echoes. The same principles apply to sonar used by boats and submarines.

The technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency), and time it takes for the ultrasound signal to return to the transducer. It also considers what type of body structure and/or tissue the sound is traveling through.

How does the procedure work?

Ultrasound imaging uses the same principles as the sonar that bats, ships, and fishermen use. When a sound wave strikes an object, it bounces back or echoes. By measuring these echo waves, it is possible to find out how far away the object is as well as its size, shape, and consistency. This includes whether the object is solid or filled with fluid.

In an ultrasound exam, a transducer both sends the sound waves and records the echoing (returning) waves. When the technologist presses the transducer against the skin, it sends small pulses of inaudible sound waves into the body. As the sound waves bounce off internal organs, fluids and tissues, the sensitive receiver in the transducer records tiny changes in the sound's pitch and direction. A computer instantly measures these signature waves and displays them as real-time pictures on a monitor. The technologist typically captures one or more frames of the moving pictures as still images. They may also save short video loops of the images.

Doppler ultrasound, a special ultrasound technique, measures the direction and speed of blood flow. The movement of blood cells causes a change in pitch of the reflected sound waves (called the Doppler effect). A computer collects and processes the sounds and creates graphs or color pictures that represent the flow of blood through the blood vessels.

How is the procedure performed?

For renal ultrasound exams, you will lie face-up on an exam table. You may have to turn to either side to improve the quality of the images.

The radiologist (a doctor trained to supervise and interpret radiology exams) or sonographer (a technologist specially trained in doing ultrasounds) will position you on the exam table. They will apply a water-based gel to the area under examination. The gel will help the transducer make secure contact with the body. It also removes air pockets between the transducer and the skin that

can block the sound waves from passing into your body. The person doing your ultrasound places the transducer on the abdomen and moves it back and forth over various areas until it captures the desired images.

There is usually no discomfort as they press the transducer against the area under examination. However, if the area is tender, you may feel pressure or minor pain from the transducer.

Once the imaging is complete, the technologist will wipe off the clear ultrasound gel from your skin. Any portions that remain will dry quickly. The ultrasound gel does not usually stain or discolor clothing.

When the exam is complete, the technologist may ask you to dress and wait while they review the ultrasound images.

What will I experience during and after the procedure?

Renal ultrasound exams are usually painless, fast, and easily tolerated.

The person doing the ultrasound may ask you to take deep breaths and hold them for few seconds during the exam to get good pictures of the kidney.

If a Doppler ultrasound exam is being done, you may hear pulse-like sounds that change in pitch as they monitor and measure the blood flow.

If your bladder is being looked at, you may need to empty your bladder after pictures are taken with the bladder being full. Additional pictures may be taken to see how well your bladder empties.

Ultrasound exams usually last about 30 minutes.

After an ultrasound exam, you should be able to resume your normal activities immediately.

Who interprets the results and how do I get them?

If your exam is being done in a radiology office then a radiologist, a doctor trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send a signed report to the doctor who requested the exam. Your doctor will then share the results with you. In some cases, the radiologist may discuss results with you after the exam.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up exams are often the best way to see if treatment is working or if a problem needs attention.

What are the benefits vs. risks?

Benefits

- Most ultrasound scanning is noninvasive (no needles or injections).
- Ultrasound is widely available, easy to use, and less expensive than most other imaging methods.
- Ultrasound is extremely safe and does not use radiation.
- Ultrasound gives a clear picture of soft tissues that do not show up well on x-ray images.
- Ultrasound provides real-time imaging. This makes it a useful tool for guiding minimally invasive procedures such as needle biopsies and fluid aspiration.
- Renal/kidney ultrasound can help to identify and evaluate a variety of kidney disorders without x-ray exposure.
- Occasionally, an ultrasound exam may be briefly uncomfortable, but it should not be painful.

Risks

- Standard diagnostic ultrasound has no known harmful effects on humans.

What are the limitations of Renal Ultrasound Imaging?

The presence of gas in the abdomen may affect image quality.

Large patients are more difficult to image by ultrasound. This is because greater amounts of tissue weaken the sound waves as they pass deeper into the body and need to return to the transducer for analysis. This results in pictures that may not be clear or good quality.

If a child is unable to hold still during the exam, the image quality may be affected.

Disclaimer

This information is copied from the RadiologyInfo Web site (<http://www.radiologyinfo.org>) which is dedicated to providing the highest quality information. To ensure that, each section is reviewed by a physician with expertise in the area presented. All information contained in the Web site is further reviewed by an ACR (American College of Radiology) - RSNA (Radiological Society of North America) committee, comprising physicians with expertise in several radiologic areas.

However, it is not possible to assure that this Web site contains complete, up-to-date information on any particular subject. Therefore, ACR and RSNA make no representations or warranties about the suitability of this information for use for any particular purpose. All information is provided "as is" without express or implied warranty.

Please visit the RadiologyInfo Web site at <http://www.radiologyinfo.org> to view or download the latest information.

Note: Images may be shown for illustrative purposes. Do not attempt to draw conclusions or make diagnoses by comparing these images to other medical images, particularly your own. Only qualified physicians should interpret images; the radiologist is the physician expert trained in medical imaging.

Copyright

This material is copyrighted by either the Radiological Society of North America (RSNA), 820 Jorie Boulevard, Oak Brook, IL 60523-2251 or the American College of Radiology (ACR), 1891 Preston White Drive, Reston, VA 20191-4397. Commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is prohibited.

Copyright © 2025 Radiological Society of North America, Inc.