

## Ultrasound - Prostate

Ultrasound of the prostate uses sound waves to produce pictures of a man's prostate gland and to help diagnose symptoms such as difficulty urinating or an elevated blood test result. It's also used to investigate a nodule found during a rectal exam, detect abnormalities, and determine whether the gland is enlarged. Ultrasound is safe, noninvasive, and does not use ionizing radiation.

This procedure requires little to no special preparation. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown and to lie on your side with your knees toward your chest. To obtain high-quality images, an ultrasound transducer – a plastic cylinder about the size of a finger – is inserted short distance into the rectum. If a biopsy is planned, you may be told to avoid aspirin and other blood thinners for seven to 10 days prior to the procedure. You may be instructed to use an enema to clean out your bowel.



### What is Ultrasound Imaging of the Prostate?

Ultrasound imaging is a noninvasive medical test that helps physicians diagnose and treat medical conditions. It is safe and painless. It produces pictures of the inside of the body using sound waves. Ultrasound imaging is also called 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 sounds that bounce back. A computer uses those sound waves to create an image. Ultrasound exams do not use radiation (x-rays). Because ultrasound captures images in real-time, it can show the structure and movement of the body's internal organs. The images can also show blood flowing through blood vessels.

Prostate ultrasound, also called transrectal ultrasound, provides images of a man's prostate gland and surrounding tissue. The exam typically requires insertion of an ultrasound probe into the rectum of the patient. The probe sends and receives sound waves through the wall of the rectum into the prostate gland which is situated right in front of the rectum.

### What are some common uses of the procedure?

A transrectal ultrasound of the prostate gland is performed to:

- detect disorders within the prostate.
- determine whether the prostate is enlarged, also known as benign prostatic hyperplasia (BPH) (<https://www.radiologyinfo.org/en/info/bph>), with measurements acquired as needed for any treatment planning.
- detect an abnormal growth within the prostate.
- help diagnose the cause of a man's infertility.

A transrectal ultrasound of the prostate gland is typically used to help diagnose symptoms such as:

- a nodule felt by a physician during a routine physical exam or prostate cancer screening exam.
- an elevated blood test result.
- difficulty urinating.

Because ultrasound provides real-time images, it also can be used to guide procedures such as needle biopsies, in which a needle is used to sample cells (tissue) from an abnormal area in the prostate gland for later laboratory testing.

## How should I prepare?

Wear comfortable, loose-fitting clothing. You may need to remove all clothing and jewelry in the area to be examined.

You may need to change into a gown for the procedure.

You may be instructed to avoid taking blood thinners, such as aspirin, for seven to 10 days prior to the procedure if a biopsy is planned. An enema may be taken two to four hours before the ultrasound to clean out the bowel.

## 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, high-frequency 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.

For ultrasound procedures such as transrectal exams that require insertion of an imaging probe, also called a transducer, the device is covered and lubricated with a gel.

## 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 determine 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.

Doctors use ultrasound to detect changes in the appearance of organs, tissues, and vessels and to detect abnormal masses, such as tumors.

In an ultrasound exam, a transducer both sends the sound waves and records the echoing (returning) waves. When the transducer is pressed against the skin, it sends small pulses of inaudible, high-frequency 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.

The same principles apply to ultrasound procedures such as transrectal ultrasound which require insertion of a special imaging probe or transducer into the body.

## How is the procedure performed?

In men, the prostate gland is located directly in front of the rectum, so the ultrasound exam is performed transrectally in order to position the imaging probe as close to the prostate gland as possible.

For a transrectal ultrasound, you will be asked to lie on your side with your knees bent. A disposable protective cover is placed over the transducer, it is lubricated, inserted through the anus and placed into the rectum.

The images are obtained from different angles to get the best view of the prostate gland.

If a suspicious lesion is identified with ultrasound or with a rectal examination, an ultrasound-guided biopsy can be performed. This procedure involves advancing a needle into the prostate gland while the radiologist watches the needle placement with ultrasound. A small amount of tissue is taken for microscopic examination.

A prostate-specific antigen (PSA) test, which measures the amount of PSA in the blood, may be administered to determine if a patient is at high risk for cancer. In this case, a biopsy is performed and an ultrasound probe is used to guide the biopsy to specific regions of the prostate gland.

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

This ultrasound examination is usually completed in less than 20 minutes.

## **What will I experience during and after the procedure?**

Ultrasound exams that insert the transducer into a body cavity may produce minimal discomfort.

If no biopsy is necessary, transrectal ultrasound of the prostate is similar to or may have less discomfort than a rectal exam performed by your doctor.

If a biopsy is necessary, additional discomfort (due to the needle insertion) is usually minimal. This is because the rectal wall is relatively insensitive to the pain in the region of the prostate. A biopsy will add time to the procedure.

Rarely, a small amount of blood may be present in the sperm or urine following the procedure.

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

## **Who interprets the results and how do I get them?**

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**

- Ultrasound is widely available, easy-to-use and less expensive than other imaging methods.
- Ultrasound imaging uses no ionizing radiation.
- Ultrasound scanning may be able to give a clearer picture of soft tissues that do not show up well on x-ray images.
- Ultrasound causes no health problems and may be repeated as often as is necessary if medically indicated.
- Ultrasound provides real-time imaging. This makes it a good tool for guiding minimally invasive procedures such as needle biopsies and fluid aspiration.

## Risks

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

## What are the limitations of Prostate Ultrasound Imaging?

Men who have had the end of their bowel (rectum) removed during prior surgery are not good candidates for ultrasound of the prostate gland because this type of ultrasound typically requires placing a probe into the rectum.

However, the radiologist may attempt to examine the prostate gland by placing a regular ultrasound imaging probe on the perineal skin of the patient (area between the legs, behind the scrotum, and in front of the anus).

Sometimes the gland can be examined by ultrasound this way, but the images may not be as detailed as with the transrectal probe. An MRI of the prostate gland is another alternative imaging option and may be done instead of or in-addition to an ultrasound.

Prostate MRI can sometimes be done without requiring anything to be placed into the rectum. It may be a good option for men who have had their rectum removed.

## Which test, procedure or treatment is best for me?

- *Prostate Cancer—Pretreatment Detection, Surveillance, and Staging* (<https://www.radiologyinfo.org/en/info/acs-prostate-cancer-detection-surveillance-staging>)

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