

## Ultrasound Imaging of the Prostate

*This information is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.*

### What is Ultrasound Imaging of the Prostate?

Ultrasound imaging, also called ultrasound scanning or sonography, involves exposing part of the body to high-frequency sound waves to produce pictures of the inside of the body. Ultrasound exams do not use ionizing radiation (as used in x-rays).

Because ultrasound images are captured in real-time, they can show the structure and movement of the body's internal organs, as well as blood flowing through blood vessels.

Ultrasound imaging is a noninvasive medical test that helps physicians diagnose and treat medical conditions.

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, 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?

You should wear comfortable, loose-fitting clothing for your ultrasound exam. You may need to remove all clothing and jewelry in the area to be examined.

You may be asked to wear a gown during the procedure.

You may be instructed to avoid taking blood thinners, such as aspirin, for seven to 10 days prior to the procedure. An enema is taken two to four hours before the ultrasound to clean out the bowel. A relatively full bladder helps with visualization of the prostate gland, so you may be asked to drink up to six glasses of water prior to your exam.

### What does the equipment look like?

Ultrasound scanners consist of a console containing a computer and electronics, a video display screen and a transducer that is used to scan the body and blood vessels. The transducer is a small hand-held device that resembles a microphone, attached to the scanner by a cord. The transducer sends out high frequency sound waves into the body and then listens for the returning echoes from the tissues in the body. The principles are similar to sonar used by boats and submarines.

The ultrasound image is immediately visible on a nearby screen that looks much like a computer or television monitor. The image is created based on the amplitude (strength), frequency and time it takes for the sound signal to return from the patient to the transducer.

For ultrasound procedures requiring insertion of the transducer, such as transvaginal or transrectal exams, the device is covered and lubricated.



## How does the procedure work?

Ultrasound imaging is based on the same principles involved in the sonar used by bats, ships and fishermen. 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 and its size, shape, and consistency (whether the object is solid, filled with fluid, or both).

In medicine, ultrasound is used to detect changes in appearance of organs, tissues, and vessels or detect abnormal masses, such as tumors.

In an ultrasound examination, a transducer both sends the sound waves and records the echoing waves. When the transducer is pressed against the skin, it directs small pulses of inaudible, high-frequency sound waves into the body. As the sound waves bounce off of internal organs, fluids and tissues, the sensitive microphone in the transducer records tiny changes in the sound's pitch and direction. These signature waves are instantly measured and displayed by a computer, which in turn creates a real-time picture on the monitor. One or more frames of the moving pictures are typically captured as still images.

The same principles apply to ultrasound procedures such as transrectal and transvaginal which require insertion of a special 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.

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 and then 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. Below is an example of a transrectal transducer (probe).

When the examination is complete, the patient may be asked to dress and wait while the ultrasound images are reviewed. However, the sonographer or radiologist is often able to review the ultrasound images in real-time as they are acquired and the patient can be released immediately.

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

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

Ultrasound exams in which the transducer is inserted into an opening of the body may produce minimal discomfort.

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

If a biopsy is performed, additional discomfort, due to the needle insertion, is usually minimal 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 within a few hours.

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

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care physician or the physician who referred you for the exam, who will share the results with you. In some cases the radiologist may discuss results with you at the conclusion of your examination.

## 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 gives a clear 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, making it a good tool for guiding minimally invasive procedures such as needle biopsies and needle aspiration.

### Risks

- For standard diagnostic ultrasound there are no known harmful effects on humans.

## What are the limitations of Prostate Ultrasound Imaging?

Men who have had the tail 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.

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