



## 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 is safe and painless, and produces pictures of the inside of the body using sound waves. Ultrasound imaging, also called ultrasound scanning or sonography, involves the use of a small transducer (probe) and ultrasound gel placed directly on the skin. High-frequency sound waves are transmitted from the probe through the gel into the body. The transducer collects the sounds that bounce back and a computer then uses those sound waves to create an image. Ultrasound examinations do not use ionizing radiation (as used in x-rays), thus there is no radiation exposure to the patient. 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, also known as benign prostatic hyperplasia (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?

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 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 scanners consist of a console containing a computer and electronics, a video display screen and a transducer that is used to do the scanning. The transducer is a small hand-held device that resembles a microphone, attached to the scanner by a cord. Some exams may use different transducers (with different capabilities) during a single exam. The transducer sends out high-frequency sound waves (that the human ear cannot hear) 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 video display screen that looks like a computer or television monitor. The image is created based on the amplitude (loudness), frequency (pitch) and time it

takes for the ultrasound signal to return from the area within the patient that is being examined to the transducer (the device placed on the patient's skin to send and receive the returning sound waves), as well as the type of body structure and composition of body tissue through which the sound travels. A small amount of gel is put on the skin to allow the sound waves to travel from the transducer to the examined area within the body and then back again. Ultrasound is an excellent modality for some areas of the body while other areas, especially air-filled lungs, are poorly suited for ultrasound.

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 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 as well as the object's size, shape and consistency (whether the object is solid or filled with fluid).

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

In an ultrasound examination, a transducer both sends the sound waves into the body and receives 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 internal organs, fluids and tissues, the sensitive receiver 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. Short video loops of the images may also be saved.

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 examination is complete, you may be asked to dress and wait while the ultrasound images are reviewed.

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 to 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 examination, you should be able to resume your normal activities immediately.

## **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 to the physician or other healthcare provider who requested the exam. Usually, the referring physician or health care provider will share the results with you. In some cases, the radiologist may discuss results with you at the conclusion of your examination.

Follow-up examinations may be necessary. Your doctor will explain the exact reason why another exam is requested. Sometimes a follow-up exam is done because a potential abnormality needs further evaluation with additional views or a special imaging technique. A follow-up examination may also be necessary so that any change in a known abnormality can be monitored over time. Follow-up examinations are sometimes the best way to see if treatment is working or if a finding is stable or changed over time.

## **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, making it a good tool for guiding minimally invasive procedures such as needle biopsies and fluid 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. However, the radiologist may attempt to examine the prostate gland by placing a regular ultrasound imaging probe on the perineal skin of the patient, between the legs and behind the scrotum of the patient. 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 pelvis may be obtained as an alternative imaging test, because it may be obtained with an external (phased array) receiver coil.

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