

## Obstetric Ultrasound

Obstetric ultrasound uses sound waves to produce pictures of a baby (embryo or fetus) within a pregnant woman, as well as the mother's uterus and ovaries. It does not use ionizing radiation, has no known harmful effects, and is the preferred method for monitoring pregnant women and their unborn babies. A Doppler ultrasound study – a technique that evaluates blood flow in the umbilical cord, fetus or placenta – may be part of this exam.

This procedure requires no special preparation. Since only your lower abdominal area needs to be exposed for this exam, you may want to wear a loose-fitting, two-piece outfit. Leave jewelry at home.



### What is Obstetrical Ultrasound Imaging?

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.

Obstetrical ultrasound provides pictures of an embryo or fetus within a woman's uterus, as well as the mother's uterus and ovaries.

A Doppler ultrasound study may be part of an obstetrical ultrasound examination.

Doppler ultrasound is a special ultrasound technique that evaluates movement of materials in the body. It allows the doctor to see and evaluate blood flow through arteries and veins in the body.

During an obstetrical ultrasound the examiner may evaluate blood flow in the umbilical cord or may, in some cases, assess blood flow in the fetus or placenta.

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

Obstetrical ultrasound is a useful clinical test to:

- establish the presence of a living embryo/fetus
- estimate the age of the pregnancy
- diagnose congenital abnormalities of the fetus
- evaluate the position of the fetus
- evaluate the position of the placenta
- determine if there are multiple pregnancies
- determine the amount of amniotic fluid around the baby
- check for opening or shortening of the cervix

- assess fetal growth
- assess fetal well-being

Some physicians also use 3-D ultrasound to image the fetus and determine if it is developing normally.

## How should I prepare?

You should wear a loose-fitting, two-piece outfit for the examination. Only the lower abdominal area needs to be exposed during this procedure.

The radiologist or sonographer may elect to examine an early pregnancy by means of transvaginal ultrasound in order to see the pregnancy more closely or to assess the cervix. *For more information on transvaginal ultrasound, see the Pelvic Ultrasound page (<https://www.radiologyinfo.org/en/info/pelvus>).*

## 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.

## 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 movement of the embryo or fetus and his or her heartbeat can be seen as an ongoing ultrasound video. Ultrasound devices also use Doppler, a special application of ultrasound, which processes echoes produced by blood flowing through the fetal heart, blood vessels and umbilical cord and turns them into audible sound. The sound has been described by patients as a whooshing noise.

Doppler ultrasound, a special ultrasound technique, measures the direction and speed of blood cells as they move through vessels. 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 most ultrasound exams, you will lie face-up on an exam table that can be tilted or moved. Patients may turn to either side to improve the quality of the images.

The radiologist (a doctor specifically trained to supervise and interpret radiology exams) or sonographer will position you on the exam table. They will apply a water-based gel to the area of the body under examination. The gel will help the transducer make secure contact with the body. It also eliminates air pockets between the transducer and the skin that can block the sound waves from passing into your body. The sonographer places the transducer on the body and moves it back and forth over the area of interest until it captures the desired images.

There is usually no discomfort from pressure as they press the transducer against the area being examined. 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.

Sometimes the radiologist determines that a transvaginal scan needs to be performed. This technique often provides improved, more detailed images of the uterus and ovaries. This method of scanning is especially useful in early pregnancy.

Doctors perform transvaginal ultrasound very much like a gynecologic exam. The doctor will insert the transducer into the vagina after you empty your bladder. The tip of the transducer is smaller than the standard speculum that a Pap test uses. The doctor places a protective cover over the transducer, lubricates it with a small amount of gel, and inserts about two to three inches of the transducer into the vagina. The doctor obtains images from different angles to get the best views of the uterus and ovaries. During transvaginal ultrasound, you will usually lie on your back, possibly with your feet in stirrups similar to a gynecologic exam.

Doctors perform Doppler sonography with the same transducer.

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

Most ultrasound exams are painless, fast, and easily tolerated.

However, at times during an obstetrical ultrasound, the sonographer may have to press more firmly to get closer to the embryo or fetus to better visualize the structures. Any discomfort is usually minimal and temporary.

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

With transvaginal scanning, there may be minimal discomfort as the transducer is inserted into the vagina.

This ultrasound examination is usually completed within 30 minutes.

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

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

- Most ultrasound scanning is noninvasive (no needles or injections).
- Occasionally, an ultrasound exam may be temporarily uncomfortable, but it should not be painful.
- Ultrasound is widely available, easy to use, and less expensive than most other imaging methods.
- Ultrasound imaging is extremely safe and does not use radiation.
- Ultrasound scanning gives a clear picture of soft tissues that do not show up well on x-ray images.
- Ultrasound is the preferred imaging modality for the diagnosis and monitoring of pregnant women and their unborn babies.
- Ultrasound has been used to evaluate pregnancy for nearly four decades and there has been no evidence of harm to the patient, embryo or fetus. Nevertheless, ultrasound should be performed only when medically indicated.
- Ultrasound allows the doctor to see inside the uterus and provides much information about the pregnancy.

### Risks

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

## What are the limitations of Obstetrical Ultrasound Imaging?

Obstetric ultrasound cannot identify all fetal abnormalities. Consequently, when there are clinical or laboratory suspicions for a possible abnormality, a pregnant woman may have to undergo nonradiologic testing such as a blood test or amniocentesis (the evaluation of fluid taken from the sac surrounding the fetus) or chorionic villus sampling (evaluation of placental tissue) to determine the health of the fetus, or she may be referred by her primary care provider to a perinatologist (an obstetrician specializing in high-risk pregnancies).

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