

# PATIENT EDUCATION



The American College of  
Obstetricians and Gynecologists  
WOMEN'S HEALTH CARE PHYSICIANS

Special Procedures • EP025

## Ultrasound Exams

**A**n **ultrasound exam** creates pictures of the internal organs of the body from sound waves. During pregnancy, an ultrasound exam can be used to examine the **fetus** in a woman's **uterus**. When a woman is not pregnant, an ultrasound exam can be used to help diagnose a medical problem or to check on a condition.

*This pamphlet explains*

- how **ultrasound** works
- how ultrasound is used during pregnancy
- how ultrasound is used for other conditions
- how an ultrasound exam is done
- specialized ultrasound techniques

### How Ultrasound Works

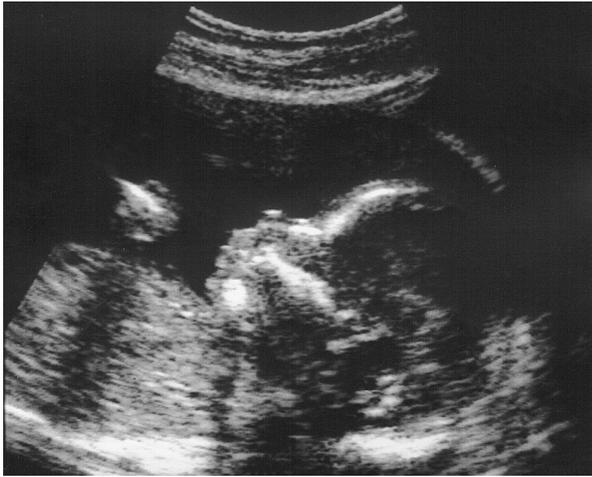
Ultrasound is energy in the form of sound waves. The most common type of ultrasound is called two-dimensional (2D) ultrasound. In this type of ultrasound, a device called a **transducer** sends sound waves through the body. The sound waves come into contact with tissues, body fluids, and bones. The waves then bounce back, like echoes. The transducer receives these echoes, which are turned into images. The images can be viewed as pictures on a video screen.

An ultrasound exam may be done in a health care professional's office, hospital, or outpatient radiology facility. It may be performed by your **obstetrician-gynecologist (ob-gyn)**, a **radiologist**, or a specially trained technician.

Ultrasound is an important tool for monitoring a pregnancy. Ultrasound exams also may be used to diagnose and monitor medical conditions that are not related to pregnancy.

### How Ultrasound Is Used During Pregnancy

Ultrasound is used in **obstetrics** to view the fetus inside the uterus. It allows your ob-gyn or other health care professional to check the fetus's health and development, monitor your pregnancy, and detect many **congenital anomalies**. A congenital anomaly is a change from what is normally expected in a baby's structure or function and is present at birth. Ultrasound also is used during **chorionic villus sampling** and **amniocentesis** to help guide these procedures.



Ultrasound image of a fetus in a woman's uterus.

There are three types of prenatal ultrasound exams: 1) standard, 2) limited, and 3) specialized. You should have at least one standard ultrasound exam during your pregnancy (see “Standard Ultrasound Exam”). If you are having only one standard exam during pregnancy, it usually is performed in the second **trimester** between 18 weeks and 22 weeks.

In addition to a standard ultrasound exam, you may have an ultrasound exam in the first trimester of pregnancy. A first-trimester ultrasound exam is not standard because it is too early to see many of the fetus's limbs and organs in detail. However, a first-trimester ultrasound is the most accurate way to estimate **gestational age** and determine the fetus's **estimated due date**. An ultrasound done this early also may be used to do the following:

- Help screen for certain **genetic disorders**, such as **Down syndrome**
- Count the number of fetuses
- Check the fetus's heart rate
- Check for **ectopic pregnancy**

### Standard Ultrasound Exam

A standard ultrasound exam is used to check the fetus's anatomy, screen for major congenital anomalies, and estimate gestational age. This exam is most often done between 18 weeks and 22 weeks. At this time, complex organs such as the heart, blood vessels, and brain usually can be seen. A standard ultrasound exam also can provide information about the following:

- The fetus's position, movement, breathing, and heart rate
- An estimate of the fetus's size and weight
- The amount of **amniotic fluid** in the uterus
- The location of the **placenta**
- The number of fetuses

If the fetus is in a good position, it may be possible to tell the sex.

Prenatal ultrasound is able to detect many, but not all, congenital anomalies that may affect your fetus. The ability of ultrasound to diagnose problems in your fetus depends on several factors. Some conditions are easier to detect on ultrasound than others, and some cannot be diagnosed before birth. Maternal weight can be a factor. In obese women, it is harder to see the fetus's anatomy. The skill of the person doing the ultrasound exam and the equipment also are important factors.

For these reasons, it is important to understand that a “normal” ultrasound exam result does not mean that your baby definitely will not be born with a birth defect. Likewise, an ultrasound exam that shows a possible problem may not mean there actually is anything wrong. If something is found on an ultrasound exam that raises concern, additional tests may be done to gather more information.

### Limited Ultrasound Exam

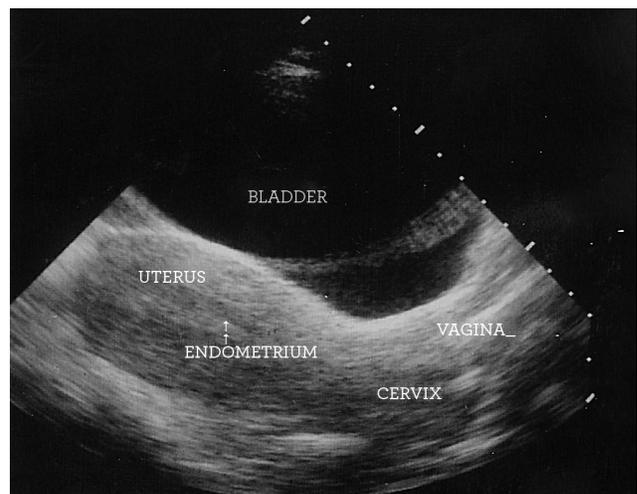
A limited ultrasound exam is performed to answer a specific question. For example, if you are in labor, a limited ultrasound exam may be done to check the fetus's position in the uterus. If you have vaginal bleeding, ultrasound may be used to see if the fetus's heart is still beating or if the placenta is too low.

### Specialized Ultrasound Exam

A specialized ultrasound exam is a more detailed exam that is performed if a problem is suspected based on risk factors or other tests. For example, if there are signs that the fetus is not growing well, the fetus's growth rate can be tracked throughout pregnancy with specialized ultrasound exams. Depending on what the suspected problem might be, specialized techniques may be used, such as Doppler ultrasonography (see “Specialized Ultrasound Techniques”).

### How Ultrasound Is Used For Other Conditions

Ultrasound is used in **gynecology** to create images of the pelvic organs to find or diagnose problems. Some of the



Ultrasound image of the pelvic organs.

ways in which ultrasound may be used include the following:

- Evaluate a mass in the pelvis (such as an ovarian **cyst** or a uterine **fibroid**)
- Look for possible causes of pelvic pain
- Look for causes of abnormal uterine bleeding or other menstrual problems
- Locate an **intrauterine device (IUD)**
- Diagnose reasons for infertility
- Monitor infertility treatments

In addition, ultrasound may be used to assess **mammography** findings that are unclear, help guide breast **biopsy** procedures, and evaluate breast lumps.

### How an Ultrasound Exam Is Done

During a pelvic ultrasound exam, an ultrasound transducer is either moved across your abdomen (**transabdominal ultrasound**) or placed in your vagina (**transvaginal ultrasound**). The type of ultrasound

exam you have will depend on what types of images are needed and why the exam is being done.

#### Transabdominal Ultrasound

If you are having a transabdominal ultrasound exam, wear loose-fitting clothes. This will allow your abdomen to be exposed easily. You may need to drink several glasses of water during the 2 hours before your exam. This will make your bladder full. A full bladder is helpful because it creates a “window” through which structures underneath it or around it can be seen more clearly.

For this exam, you will lie on a table with your abdomen exposed from the lower part of the ribs to the hips. A gel is applied to the surface of the abdomen. This improves contact of the transducer with the skin surface. The handheld transducer then is moved along the abdomen to make images.

#### Transvaginal Ultrasound

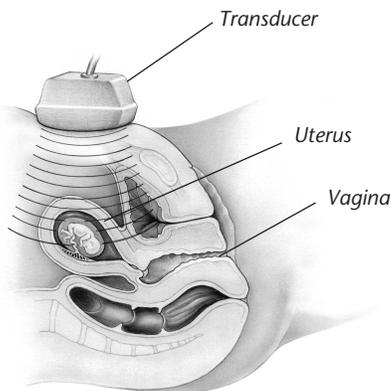
For a transvaginal ultrasound exam, you will be asked to change into a hospital gown or undress from the waist down. It is recommended that you empty your bladder before the test. You will lie on your back with your feet in stirrups, like you would for a pelvic exam. The transducer for this exam is shaped like a wand. It is covered with a sheath, similar to a condom, and is lubricated before it is inserted into the vagina.

### Specialized Ultrasound Techniques

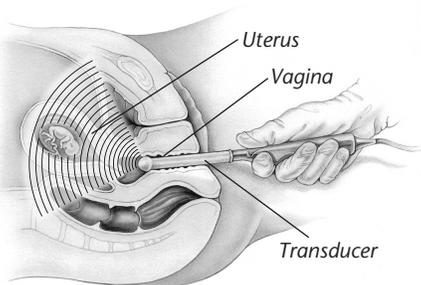
If your ob-gyn or other health care professional suspects a problem based on other tests, you may have a specialized ultrasound exam. These specialized ultrasound exams include the following:

- **Three-dimensional (3D) ultrasound**—In a 3D ultrasound exam during pregnancy, multiple 2D images of a fetus are taken at various angles. These images are then assembled into one 3D image. A 3D ultrasound exam may be done to help diagnose a possible problem that is found on a 2D ultrasound. Currently, 3D ultrasound has not been proven to be more useful than 2D ultrasound for diagnosing fetal problems during pregnancy.
- **Doppler ultrasound**—This test is done during pregnancy using transabdominal ultrasound. Sound waves are used to measure blood flow in the fetus’s **umbilical cord** or other blood vessels. This test may be done if the fetus is not growing normally or with other tests to detect **anemia** in the fetus.
- **Sonohysterography**—This transvaginal ultrasound exam looks for problems within the uterus in women who are not pregnant. It often is part of an infertility evaluation. Sonohysterography can also be used to diagnose the cause of abnormal uterine bleeding or repeat miscarriages. Fluid is put into the uterus through the **cervix** using a thin plastic tube. Ultrasound then is used to create images of the lining of the uterus. The fluid shows more detail than when ultrasound is used alone.

#### Transabdominal Ultrasound Exam



#### Transvaginal Ultrasound Exam



*With ultrasound, energy in the form of sound waves is reflected off of internal organs and the fetus during pregnancy. The reflected sound waves are changed into pictures that you and your health care professional can see on a video screen.*

## Risks

Currently, there is no evidence that ultrasound is harmful to a woman or a fetus. No links have been found between ultrasound and birth defects, childhood cancer, or developmental problems later in life. However, it is possible that effects could be identified in the future. For this reason, it is recommended that ultrasound exams be performed only for medical reasons. The technician should use the lowest level of ultrasound energy possible.

Experts agree that casual use of ultrasound during pregnancy should be avoided. There are nonmedical centers that use ultrasound for the sole purpose of creating portraits of a fetus. These centers often are found in shopping malls. Workers at these centers may not be trained to interpret the images for you. You may be falsely reassured that your baby is doing well, when in fact there may be a problem. Or you may be alarmed that the image shows an abnormality and, because these centers are not medical facilities, you will not receive an expert medical opinion. If you wish to have an image of your fetus, you can request one during a standard ultrasound exam performed by a health care professional.

## Finally...

An ultrasound exam may be used to check on the progress of your pregnancy or to evaluate gynecologic problems that are unrelated to pregnancy. Your ob-gyn or other health care professional will explain the reason for your ultrasound exam and tell you how to prepare for it.

## Glossary

**Amniocentesis:** A procedure in which a needle is used to withdraw and test a small amount of amniotic fluid and cells from the sac surrounding the fetus.

**Amniotic Fluid:** Water in the sac surrounding the fetus in the mother's uterus.

**Anemia:** Abnormally low levels of blood or red blood cells in the bloodstream. Most cases are caused by iron deficiency, or lack of iron.

**Biopsy:** A minor surgical procedure to remove a small piece of tissue that is then examined under a microscope in a laboratory.

**Cervix:** The lower, narrow end of the uterus at the top of the vagina.

**Chorionic Villus Sampling (CVS):** A procedure in which a small sample of cells is taken from the placenta and tested.

**Congenital Anomalies:** Changes in a body structure or function from what is normally expected that are present from birth.

**Cyst:** A sac or pouch filled with fluid.

**Down Syndrome:** A genetic disorder that causes abnormal features of the face and body, medical problems such as heart defects, and intellectual disability. Most cases of Down syndrome are caused by an extra chromosome 21 (trisomy 21). Many children with Down syndrome live to adulthood.

**Ectopic Pregnancy:** A pregnancy in which the fertilized egg begins to grow in a place other than inside the uterus, usually in one of the fallopian tubes.

**Estimated Due Date (EDD):** The estimated date that a baby will be born.

**Fetus:** The stage of prenatal development that starts 8 weeks after fertilization and lasts until the end of pregnancy.

**Fibroid:** A growth, usually benign, that forms in the muscle of the uterus.

**Genetic Disorders:** Disorders caused by a change in genes or chromosomes.

**Gestational Age:** The age of a pregnancy, usually calculated from the number of weeks that have elapsed from the first day of the last normal menstrual period and often using findings from an ultrasound examination performed in the first or second trimester of pregnancy.

**Gynecology:** The branch of medicine that involves care of the female reproductive system and breasts.

**Intrauterine Device (IUD):** A small device that is inserted and left inside the uterus to prevent pregnancy.

**Mammography:** An imaging technique in which X-rays of the breast are used to detect breast cancer. The image that is created is called a mammogram.

**Obstetrician–Gynecologist (Ob-Gyn):** A physician with special skills, training, and education in women's health.

**Obstetrics:** The branch of medicine that involves management of pregnancy, labor, and the postpartum period.

**Placenta:** Tissue that provides nourishment to and takes waste away from the fetus.

**Radiologist:** A physician who specializes in interpreting images taken with various medical imaging techniques.

**Sonohysterography:** A procedure in which sterile fluid is injected into the uterus through the cervix while ultrasound images are taken of the inside of the uterus.

**Transabdominal Ultrasound:** A type of ultrasound in which a device is moved across the abdomen.

**Transducer:** A device that emits sound waves and translates the echoes into electrical signals.

**Transvaginal Ultrasound:** A type of ultrasound in which a device specially designed to be placed in the vagina is used.

**Trimester:** Any of the three 3-month periods into which pregnancy is divided.

**Ultrasound:** Sound waves that can be used to examine internal structures or as a treatment for certain conditions.

**Ultrasound Exam:** A test in which sound waves are used to examine internal structures. During pregnancy, it can be used to examine the fetus.

**Umbilical Cord:** A cord-like structure containing blood vessels that connects the fetus to the placenta.

**Uterus:** A muscular organ located in the female pelvis that contains and nourishes the developing fetus during pregnancy.

This Patient Education Pamphlet was developed by the American College of Obstetricians and Gynecologists. Designed as an aid to patients, it sets forth current information and opinions on subjects related to women's health. The average readability level of the series, based on the Fry formula, is grade 6–8. The Suitability Assessment of Materials (SAM) instrument rates the pamphlets as “superior.” To ensure the information is current and accurate, the pamphlets are reviewed every 18 months. The information in this pamphlet does not dictate an exclusive course of treatment or procedure to be followed and should not be construed as excluding other acceptable methods of practice. Variations, taking into account the needs of the individual patient, resources, and limitations unique to the institution or type of practice, may be appropriate.

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