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Doppler Ultrasound

What is a Doppler ultrasound?

A Doppler ultrasound is a type of ultrasound [https://medlineplus.gov/lab-tests/sonogram/] imaging test that uses sound waves to show how well your blood flows through your blood vessels. It can be used to examine blood flow in many parts of your body, including many of your organs and your neck, arms, and legs.

A Doppler ultrasound can examine your arteries (blood vessels that carry oxygen-rich blood from your heart and lungs to your body) and veins (blood vessels that carry blood from your body back to your heart and lungs to get more oxygen).

Doppler ultrasound works by bouncing sound waves off red blood cells flowing through your blood vessels. The ultrasound device measures the echoes that bounce back from the cells. Cells that are moving away from the sound waves make different echoes than cells that are moving closer to the sound waves. This is called the Doppler effect, named after the scientist who discovered it.

Doppler ultrasound can check for blood vessel conditions [https://medlineplus.gov/vasculardiseases.html] that affect the amount, speed, and direction of blood flow in different parts of your body. It can help find narrowed arteries, blood clots [https://medlineplus.gov/bloodclots.html] , and other conditions.

There are different types of Doppler ultrasound tests that can be used to gather different information. They include:

- **Color Doppler.** This test uses a computer to change sound wave measurements into different colors. The colors show the speed and direction of blood flow.
- **Power Doppler.** This is a newer type of color Doppler. It can show much smaller blood vessels and slower blood flow than standard color Doppler. But it can't show the direction of blood flow.
- **Spectral Doppler.** This test shows blood flow information in a graph. It can show how much of a blood vessel is blocked. There are two types of spectral Doppler ultrasound:
    - A "pulsed wave" Doppler can show where blood is flowing at different speeds, but it can't record blood flowing at high speeds.
    - A "continuous wave" Doppler can record very fast blood flow, but it can't show the exact location in the blood vessel.
- **Duplex Doppler.** This test uses standard ultrasound to take images showing blood flow. Then a computer turns the images into a graph, as in spectral Doppler.

Other names: Doppler ultrasonography, vascular ultrasound

What is it used for?

Doppler ultrasound tests are used to help diagnose problems that affect the flow of blood in many parts of the body, including:

- **Your heart.** A Doppler ultrasound is part of an echocardiogram, which is a test that shows the size and shape of your heart and how well it's pumping blood. The test can help diagnose many heart conditions [https://medlineplus.gov/heartdiseases.html] , including:
  - Narrowed and blocked arteries [https://medlineplus.gov/atherosclerosis.html]
  - Aneurysm [https://medlineplus.gov/aneurysms.html] , a bulge in the wall of artery
  - Heart valve diseases [https://medlineplus.gov/heartvalvediseases.html]
  - Congenital heart defects [https://medlineplus.gov/congenitalheartdefects.html] , structural problems in the heart from birth
- **Your arms and legs.** The test can check for conditions that reduce blood flow including:
  - Deep vein thrombosis [https://medlineplus.gov/deepveinthrombosis.html] (DVT), blood clots, usually in your legs
  - Peripheral arterial disease [https://medlineplus.gov/peripheralarterialdisease.html] (PAD), narrow or blocked arteries in your legs or arms
  - Varicose veins [https://medlineplus.gov/varicoseveins.html] , weak valves in your veins that let blood flow backwards, usually in your legs
- **Your neck and brain.** The test can look for conditions that affect blood flow to your brain and cause stroke [https://medlineplus.gov/stroke.html] . These include narrowed arteries and blood clots in your neck (carotid artery disease [https://medlineplus.gov/carotidarterydisease.html]) and narrowed arteries in your brain.
- **Your abdomen (belly).** The test can be used to check blood flow in your organs and to look for aneurysms.
- **A new organ after** transplantation surgery [https://medlineplus.gov/organtransplantation.html] **.** The test can show whether blood is flowing through the organ normally.

A Doppler ultrasound can also help diagnose blood vessel tumors and problems with the structure of your blood vessels that you were born with.

During pregnancy, Doppler ultrasound is used if there are concerns about blood flow between a pregnant person and the unborn baby. It can also check the baby's blood flow.

Why do I need a Doppler ultrasound?

You may need a Doppler ultrasound if you have symptoms of abnormal blood flow. Your symptoms will depend on the part of your body that's affected and the cause of abnormal blood flow.

You may also need a Doppler ultrasound if you:

- Have a high risk of having a stroke or have had a stroke or a transient ischemic attack [https://medlineplus.gov/transientischemicattack.html] (a stroke that lasts a few minutes). An ultrasound of your brain, called a transcranial Doppler ultrasound, can diagnose the cause of a stroke and/or help estimate your risk for having a stroke in the future.
- Had an injury to your blood vessels.
- Have high blood pressure [https://medlineplus.gov/highbloodpressure.html] that could be caused by blocked arteries in your kidneys.
- Are being treated for a condition that affects blood flow. A Doppler ultrasound can show how much the treatment is helping.

- Are pregnant. You may need this test if your unborn baby may be smaller than normal for your stage of pregnancy. You may also need this test if you have certain health problems [https://medlineplus.gov/healthproblemsinpregnancy.html] such as high blood pressure in pregnancy [https://medlineplus.gov/highbloodpressureinpregnancy.html] (preeclampsia) or sickle cell disease [https://medlineplus.gov/sicklecelldisease.html] .

What happens during a Doppler ultrasound?

A Doppler ultrasound is often done by a sonographer, a health care professional who has special training to do ultrasound exams. The test may be done in different ways depending on the part of your body that's being examined. Most Doppler ultrasound exams include these general steps:

- You will remove clothing from the area that will be examined and lie on a table.
- The sonographer will spread a special gel on your skin over the area that will be examined.
- The sonographer will move a wand-like device, called a transducer, across your skin. The device sends sound waves into your body, but you can't feel them.
- The sound waves bounce off red blood cells in your bloodstream.
- You may hear whooshing sounds as the ultrasound device picks up the echoes and turns them into images or graphs on a computer screen.
- After the exam is over, the sonographer will wipe the gel off your body.

For certain ultrasound exams, the ultrasound device is placed inside a body opening. Depending on the organs being checked, the device may be placed in the:

- **Vagina.** This is called a transvaginal ultrasound. It helps view the uterus and ovaries.
- **Rectum.** This is called a transrectal ultrasound. It's usually done to view the prostate gland.
- **Esophagus** (the tube that connects your mouth and stomach). This is called a transesophageal echocardiogram (TEE). It's done to get clear images of the heart.

Will I need to do anything to prepare for the test?

Preparations for a Doppler ultrasound depend on what part of your body is being checked. Your health care provider will tell you if you need to prepare and what to do. You may need to:

- Fast (not eat or drink) for several hours before the test.
- Stop smoking or using products that have nicotine for two hours or more before your test. Nicotine causes blood vessels to narrow, which could change your results.

Are there any risks to the test?

Doppler ultrasound has not been linked to any health harms. It's generally considered safe when trained sonographers use it correctly. Doppler ultrasound doesn't use ionizing radiation [https://medlineplus.gov/radiationexposure.html] like x-rays [https://medlineplus.gov/xrays.html] use, which makes it safer than x-ray. That's why ultrasound is the most widely used medical imaging method for viewing an unborn baby during pregnancy.

But in certain cases, ultrasound can affect fluids and tissues in the body. That's why most medical experts recommend using ultrasound only when it's needed to provide important medical information.

Learn more about laboratory tests, reference ranges, and understanding results [https://medlineplus.gov/lab-tests/how-to-understand-your-lab-results/] .

What do the results mean?

If your Doppler ultrasound results are normal, it means that the blood vessels that were checked looked healthy. They have no narrowing or blood clots. The blood flow was normal.

If your results aren't normal, the meaning will depend on what area of your body was tested and the type of Doppler ultrasound that you had. Talk with your provider about what your results say about your health and need for treatment.

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