TEST

Doppler ultrasound exam of an arm or leg

A Doppler ultrasound uses sound waves to assess blood flow in an arm or leg.

WHAT IT MEASURES
Blood flow through the arteries or veins

SAMPLE
None

FASTING NEEDED?
No, unless your imaging service gives different instructions

HOW LONG IT TAKES
Usually 30 to 60 minutes

RESULTS IN
Same day to several days; varies by laboratory or imaging service

USED FOR
Diagnosis and monitoring of artery or vein problems

MAIN LIMITATION
Accuracy falls when vessels cannot be fully seen or compressed

Overview

A Doppler ultrasound uses high-frequency sound waves to show how blood moves through the arteries or veins in an arm or leg. Arteries carry blood away from the heart, while veins return it.

The test may also be called a vascular or duplex ultrasound. It combines pictures of blood vessels with blood-flow measurements.

A venous exam can detect a blood clot, blocked vein, or damaged vein valves. An arterial exam can identify narrowing, blockage, abnormal widening, or changes in blood flow. The test does not use radiation and usually requires no needles, injections, or contrast dye.

Why the test is ordered

A venous Doppler ultrasound may be ordered for swelling, pain, tenderness, warmth, or a change in skin colour, especially in one limb. It can also assess varicose veins or venous reflux, in which faulty valves allow blood to flow backwards.

An arterial exam may be ordered for pain during walking or arm use, slow-healing wounds, cool

skin, weak pulses, or skin-colour changes. It can also check blood flow after surgery, angioplasty, or stent placement.

The main reasons include:

- Looking for a deep vein blood clot
- Finding narrowed or blocked arteries
- Checking blood-flow direction and speed
- Assessing damaged vein valves
- Monitoring a bypass graft, stent, or known vessel problem

Who should have the test

You may be offered this test when your symptoms, history, examination, or another test suggests a circulation problem.

The chance of a vein clot may be higher after surgery, prolonged immobility, a previous clot, pregnancy, cancer treatment, or use of certain hormone medicines. Arterial testing may be appropriate if you have symptoms of reduced blood supply or a known arterial condition.

Sudden severe limb pain with a pale, cold, numb, or weak arm or leg can indicate a serious loss of blood flow. Seek emergency care rather than waiting for a routine appointment.

One-sided swelling or pain also needs prompt assessment. If it occurs with chest pain, sudden shortness of breath, coughing up blood, fainting, or collapse, seek emergency care.

How to prepare

Most exams require no special preparation. You can usually eat, drink, and take your regular medicines unless your appointment instructions say otherwise.

Wear loose clothing that allows access to the limb. You may need to remove jewellery or change into a gown.

Tell the sonographer about previous surgery, blood clots, stents, bypass grafts, wounds, or dressings. Mention if lying flat is difficult or painful.

Do not remove a medical dressing or compression bandage unless instructed. The imaging service will explain whether it needs adjusting.

What happens during the test

You will usually lie on an examination table, although you may be asked to sit, stand, turn, or change position.

The sonographer applies water-based gel and moves a handheld transducer over your skin. It sends and receives sound waves to create images and measure blood flow.

During a venous exam, the sonographer may press firmly to check whether a vein closes normally. A vein containing a clot may not compress fully. You may be asked to hold your breath, and the limb may be squeezed briefly. Reflux testing may be performed while you stand.

During an arterial exam, blood pressure cuffs may be placed around the limb. The machine may make swishing sounds representing blood flow.

The test usually takes 30 to 60 minutes but may take longer if both limbs or several vessels are examined.

Understanding your results

A specialist reviews the images and measurements and sends a report to the healthcare professional who ordered the test.

A venous report may describe:

An arterial report may describe plaque, narrowing, blockage, abnormal widening, or changes in blood-flow speed and pattern. It may compare pressures in different parts of the limb.

A normal result generally means the examined vessels were open and blood flow appeared appropriate. However, your symptoms, history, examination, and other tests still matter. There is no single normal blood-flow value for every vessel and person.

- Whether veins are open and compress normally
- Whether a clot is present and where it is
- Whether findings appear recent or longstanding
- Whether blood flows in the expected direction
- Whether vein valves allow backward flow

What affects the results

Accuracy depends on whether the relevant vessels can be seen and reached. Deep vessels,

swelling, wounds, pain, larger body size, casts, dressings, or limited movement can make examination difficult. Bones may hide veins near the upper chest and shoulder.

Exercise, room temperature, anxiety, nicotine, caffeine, and some medicines can affect arterial measurements. Follow any instructions about avoiding these before the test.

Body position affects blood flow, particularly during reflux testing. An irregular heartbeat or reduced heart pumping strength can alter Doppler patterns.

Calcium deposits may make arteries difficult to compress, producing pressure readings that appear high even when circulation is reduced. Pregnancy, previous clots, surgery, grafts, and stents can also affect interpretation.

Accuracy and limitations

Doppler ultrasound identifies many clots in the larger deep veins of the thigh and behind the knee. It is less reliable for small calf clots and veins deep in the pelvis or beneath the collarbone. A recent or very small clot may not appear on the first scan.

A negative result does not always end the investigation. If a clot remains likely, repeat ultrasound or another test may be recommended. Old scarring from a previous clot can also resemble a current problem.

Arterial results may be affected by calcification, slow flow, branching or twisting vessels, or incomplete views. Turbulence around a bend can sometimes make narrowing appear worse.

CT or MR angiography or venography may be used when deep or complex vessels need further assessment. These tests have different risks and are not necessary for everyone.

Risks and complications

Doppler ultrasound has no known radiation risk because it uses sound waves. Pressure from the transducer or a blood pressure cuff may be uncomfortable over a tender or swollen area, but lasting complications are not expected.

What happens next

If the result is reassuring, your healthcare professional may consider other causes of your symptoms. Further imaging may not be needed.

If a clot or important arterial blockage is found, next steps may include medicine, further

imaging, specialist referral, or urgent treatment. An unclear or incomplete examination may be repeated or followed by a different imaging test.

Do not wait for a routine results appointment if you develop sudden chest pain, severe shortness of breath, fainting, or a suddenly cold, pale, numb, weak, or severely painful limb. Seek emergency care.

Common questions

Can I drink coffee before a Doppler ultrasound?

Usually, yes. Caffeine can temporarily affect blood vessels, so follow your instructions if detailed arterial measurements are planned.

Do I need to fast?

Usually not. Fasting may be requested if an abdominal vascular examination is also being performed.

Does the time of day matter?

Usually not. For reflux testing or monitoring, similar timing and positioning may make comparisons more consistent.

Can I exercise beforehand?

Light activity is generally fine. Avoid strenuous exercise immediately beforehand if resting measurements are required.

Can I take my medicines?

Usually, yes. Do not stop blood thinners like warfarin or apixaban , blood pressure medicines, or other prescribed treatments unless the responsible healthcare professional tells you to.

Will the scan hurt?

The sound waves do not hurt. Pressure over a tender area or inflation of a blood pressure cuff may cause brief discomfort.

Sources

- RadiologyInfo.org: Vascular Ultrasound , American College of Radiology and Radiological Society of North America

- NICE guideline NG158: Venous thromboembolic diseases-diagnosis, management and thrombophilia testing , National Institute for Health and Care Excellence
- NICE guideline CG147: Peripheral arterial disease-diagnosis and management , National Institute for Health and Care Excellence
- ACR Appropriateness Criteria: Suspected Lower-Extremity Deep Vein Thrombosis , American College of Radiology
- Ultrasound Imaging , US Food and Drug Administration
- European Society for Vascular Surgery 2021 Clinical Practice Guidelines on the Management of Venous Thrombosis , European Journal of Vascular and Endovascular Surgery