

## **Tests for Peripheral Vascular Disease (PVD)**

## What is peripheral vascular disease?

Vascular disease is disease of the blood vessels (arteries and veins). A common and serious form of vascular disease (coronary artery disease) affects the arteries that give oxygen to the heart muscle. **Peripheral vascular** disease (PVD) affects the areas that are "peripheral" (outside) your heart. Below are the most common types of PVD:

 Carotid artery disease affects the arteries that carry blood to your brain. It happens when one or more arteries are narrowed or blocked by plaque, a fatty substance that builds up inside artery walls. Carotid artery disease can increase your risk of stroke. It can also cause transient ischemic attacks (TIAs) —temporary changes in brain function that are sometimes called "mini-strokes."



Plaque can build up to narrow or block an artery.

Peripheral arterial disease

 (PAD) is also caused by plaque buildup, but it often affects the arteries to your legs and feet.
 It can cause pain that feels like a dull cramp or heavy tiredness in your hips or legs when you exercise or climb stairs. This pain is sometimes called claudication.
 If PAD worsens, it can cause cold skin on your feet or legs, skin color changes, and sores that don't heal.

• Deep vein thrombosis affects the veins, usually in your legs or feet. A clot (thrombosis) forms inside the vein. The clot can break free and travel to your lungs, where it can cause serious illness or even death.



• Venous insufficiency affects the veins, usually in your legs or feet. Your veins have valves that keep blood from flowing backward as it moves toward your heart. If the valves stop working, blood backs up in your body, usually in your legs. Venous insufficiency can cause pain and swelling in your legs, ankles, and feet. It can also cause discolored skin, leg sores, or varicose (enlarged, visible) veins.



## How is PVD diagnosed?

To confirm that you have PVD, your doctor can do several quick, painless tests. The most common tests are described on the next page.

## What are the tests for PVD?

Two common tests for PVD are described below. Generally, you don't need to prepare beforehand, and they usually take less than an hour. You'll get the results in a follow-up appointment.

#### Ankle-brachial index (ABI) test

An ABI test compares the blood pressure in your ankle and your arm. Here's what happens during an ABI test:

- **Getting ready**. You'll change into a gown and lie down on an exam table.
- **Blood pressure cuffs.** A technician will place blood pressure cuffs on your arms and ankles and inflate the cuffs.
- Ultrasound. As the cuffs deflate, a technician will hold an ultrasound device called a transducer against each ankle and arm. The device uses high-frequency sound waves to measure the blood pressure in each area.



- **Ratio.** The ankle blood pressures will be divided by the highest arm pressure to create an ABI ratio. A ratio lower than normal means you probably have PAD.
- Treadmill exercise, then a second measurement (optional). Depending on your situation, you might exercise on a treadmill. You will then have another ABI test. Note: If you don't feel well during the test, ask the technician to stop the treadmill. Wait for the treadmill to stop completely before you step off it.

#### Doppler ultrasound

A Doppler ultrasound test uses high-frequency sound waves to evaluate the flow of blood in your blood vessels. Doppler ultrasound can be used to evaluate blood vessels in your legs, neck, or abdomen. Here's what happens during a Doppler ultrasound test:

- **Getting ready**. You'll change into a gown and lie down on an exam table.
- **Gel.** Depending on the area being studied, a technician will put water-based gel on segments of your legs or on your neck.
- Ultrasound. A Doppler ultrasound device, called a transducer, will be moved along your skin in the area that is being studied. The transducer uses high-velocity sound waves to evaluate the blood flow through your blood vessels. The test can show narrowed blood vessels, blood clots, or areas where the blood is flowing backward.
- **Cleaning up.** At the end of the test, the technician will wipe off the ultrasound gel so that you can dress to go home.



# If the tests show I have PVD, how will it be treated?

Your doctor will discuss your treatment options with you. Possible treatments for vascular disease include:

- Lifestyle changes. You can control many of the factors that cause PVD. See the notes at right.
- **Medication**. You might receive medication to help control your cholesterol or blood pressure, help your body remove extra fluid, keep your blood from clotting easily, or help clear your arteries.
- **Compression stockings**. Special stockings, sometimes called T.E.D. hose, squeeze your lower legs to help keep the blood flowing.
- Catheter-based treatments. A catheter (a thin, flexible tube) may be inserted through your skin into a major blood vessel and threaded to the area that needs treatment. The catheter can carry an empty balloon that is then inflated to compress the plaque and open up the artery. A **stent**, a wire mesh support, can also be inserted to help prop an artery open.
- **Surgery**. Surgery might be used to remove faulty veins, repair vein valves, bypass a section of blocked artery, or clean out plaque buildup.

## What are the risk factors for PVD?

General risk factors for PVD include:

- Smoking
- Being overweight
- Physical inactivity
- High blood pressure
- Family history of PVD, heart disease, or stroke
- Age as you get older, your risk increases

Additional risk factors for artery problems include diabetes and high blood cholesterol.

Additional risk factors for vein problems include standing or sitting for long periods.

## How can I prevent or reduce PVD?

Some risk factors for PVD can't be changed, such as your family history or your age. But you can control or eliminate other risk factors. Taking action can help prevent vascular disease or keep it from getting worse.

- If you smoke, quit. This is the single biggest difference you can make in your health. Intermountain's booklet *Quitting Tobacco: Your Journey to Freedom* has information and encouragement. And help is available. Call 1-888-567-TRUTH for the Utah Tobacco Quit Line, or go to www.utah.quitnet.com.
- If you're carrying extra weight, lose it slowly and safely. Intermountain's *Weigh to Health* booklet explains how. To find out about classes offered by Intermountain, talk to your doctor.
- **Step up your physical activity.** Physical activity will help you lose weight, lower your cholesterol levels, lower your blood pressure, and strengthen your heart.
- **Control your blood pressure** to protect your vessels from further damage. Medication, exercise, and weight loss can help.
- If you have diabetes, manage it by keeping your blood sugar between 90 to 130. Your doctor can help if you've been struggling with this.
- **Control your cholesterol.** Your total cholesterol should be under 200 and LDL ("bad") cholesterol should be under 100. This can be done with medications and a low-fat, low-cholesterol diet.
- Eat a diet low in saturated fats, cholesterol, and salt — and high in fresh fruits, fiber, and vegetables. For guidelines, see the *Weigh to Health* brochure or the American Heart Association website at www.americanheart.org.
- Follow your doctor's directions about medication and supplements. If your doctor prescribes medication, take it regularly as prescribed even if you start feeling better. Also, check with your doctor before you take other supplements or herbal remedies.

## Talking with your doctor about tests for PVD

The table below lists the most common potential benefits, risks, and alternatives for PVD testing. Other benefits or risks may apply in your unique medical situation. Talking with your doctor is the most important part of learning about these risks and benefits. If you have questions, be sure to ask.

Potential benefits	Risks and potential complications	Alternatives
<ul> <li>Tests for PVD can reveal whether you have peripheral vascular disease, and if you do, how severe it is.</li> <li>The tests described in this handout are non-invasive (they don't involve cuts or needles).</li> </ul>	Tests for PVD are extremely safe. You may feel minor discomfort from blood pressure cuffs or from the ultrasound probe pressing against your skin.	<ul><li>Alternatives to the PVD tests described in this handout include:</li><li>MRI (magnetic resonance imaging)</li><li>Angiogram</li></ul>

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