National Heart, Lung, and Blood Institute

For more information, visit http://www.nhlbi.nih.gov/health/health-topics/topics/dvt/

What Is Deep Vein Thrombosis?

Deep vein thrombosis (throm-BO-sis), or DVT, is a blood clot that forms in a vein deep in the body. Blood clots occur when blood thickens and clumps together.

Most deep vein blood clots occur in the lower leg or thigh. They also can occur in other parts of the body.

A blood clot in a deep vein can break off and travel through the bloodstream. The loose clot is called an embolus (EM-bo-lus). It can travel to an artery in the lungs and block blood flow. This condition is called pulmonary embolism (PULL-mun-ary EM-bo-lizm), or PE.

PE is a very serious condition. It can damage the lungs and other organs in the body and cause death.

Blood clots in the thighs are more likely to break off and cause PE than blood clots in the lower legs or other parts of the body. Blood clots also can form in veins closer to the skin's surface. However, these clots won't break off and cause PE.

The animation below shows a deep vein blood clot. Click the "start" button to play the animation. Written and spoken explanations are provided with each frame. Use the buttons in the lower right corner to pause, restart, or replay the animation, or use the scroll bar below the buttons to move through the frames.

The animation shows how a blood clot in a deep vein of the leg can break off, travel to the lungs, and block blood flow.

Other Names for Deep Vein Thrombosis

- Blood clot in the leg.
- Thrombophlebitis.
- Venous thrombosis.
- Venous thromboembolism (VTE). This term is used for both deep vein thrombosis and pulmonary embolism.

What Causes Deep Vein Thrombosis?

Blood clots can form in your body's deep veins if:

- A vein's inner lining is damaged. Injuries caused by physical, chemical, or biological factors can damage the veins. Such factors include surgery, serious injuries, inflammation, and immune responses.
- Blood flow is sluggish or slow. Lack of motion can cause sluggish or slow blood flow. This may occur after surgery, if you're ill and in bed for a long time, or if you're traveling for a long time.
- Your blood is thicker or more likely to clot than normal. Some inherited conditions (such as factor V Leiden) increase the risk of blood clotting. Hormone therapy or birth control pills also can increase the risk of clotting.

Who Is at Risk for Deep Vein Thrombosis?

The risk factors for deep vein thrombosis (DVT) include:

- A history of DVT.
- Conditions or factors that make your blood thicker or more likely to clot than normal. Some inherited blood disorders (such as factor V Leiden) will do this. Hormone therapy or birth control pills also increase the risk of clotting.
- Injury to a deep vein from surgery, a broken bone, or other trauma.
- Slow blood flow in a deep vein due to lack of movement. This may occur after surgery, if you're ill and in bed for a long time, or if you're traveling for a long time.
- Pregnancy and the first 6 weeks after giving birth.
- Recent or ongoing treatment for cancer.
- A central venous catheter. This is a tube placed in a vein to allow easy access to the bloodstream for medical treatment.
- Older age. Being older than 60 is a risk factor for DVT, although DVT can occur at any age.
- Overweight or obesity.
- Smoking.

Your risk for DVT increases if you have more than one of the risk factors listed above.

What Are the Signs and Symptoms of Deep Vein Thrombosis?

The signs and symptoms of deep vein thrombosis (DVT) might be related to DVT itself or pulmonary embolism (PE). See your doctor right away if you have signs or symptoms of either condition. Both DVT and PE can cause serious, possibly life-threatening problems if not treated.

Deep Vein Thrombosis

Only about half of the people who have DVT have signs and symptoms. These signs and symptoms occur in the leg affected by the deep vein clot. They include:

- Swelling of the leg or along a vein in the leg
- Pain or tenderness in the leg, which you may feel only when standing or walking
- Increased warmth in the area of the leg that's swollen or painful
- Red or discolored skin on the leg

Pulmonary Embolism

Some people aren't aware of a deep vein clot until they have signs and symptoms of PE. Signs and symptoms of PE include:

- Unexplained shortness of breath
- Pain with deep breathing
- Coughing up blood

Rapid breathing and a fast heart rate also may be signs of PE.

How Is Deep Vein Thrombosis Diagnosed?

Your doctor will diagnose deep vein thrombosis (DVT) based on your medical history, a physical exam, and test results. He or she will identify your risk factors and rule out other causes of your symptoms.

For some people, DVT might not be diagnosed until after they receive emergency treatment for pulmonary embolism (PE).

Medical History

To learn about your medical history, your doctor may ask about:

- Your overall health
- Any prescription medicines you're taking
- Any recent surgeries or injuries you've had
- Whether you've been treated for cancer

Physical Exam

Your doctor will check your legs for signs of DVT, such as swelling or redness. He or she also will check your blood pressure and your heart and lungs.

Diagnostic Tests

Your doctor may recommend tests to find out whether you have DVT.

Common Tests

The most common test for diagnosing deep vein blood clots is ultrasound. This test uses sound waves to create pictures of blood flowing through the arteries and veins in the affected leg.

Your doctor also may recommend a D-dimer test or venography (ve-NOG-rah-fee).

A D-dimer test measures a substance in the blood that's released when a blood clot dissolves. If the test shows high levels of the substance, you may have a deep vein blood clot. If your test results are normal and you have few risk factors, DVT isn't likely.

Your doctor may suggest venography if an ultrasound doesn't provide a clear diagnosis. For venography, dye is injected into a vein in the affected leg. The dye makes the vein visible on an x-ray image. The x ray will show whether blood flow is slow in the vein, which may suggest a blood clot.

Other Tests

Other tests used to diagnose DVT include magnetic resonance imaging (MRI) and computed tomography (to-MOG-rah-fee), or CT, scanning. These tests create pictures of your organs and tissues.

You may need blood tests to check whether you have an inherited blood clotting disorder that can cause DVT. This may be the case if you have repeated blood clots that are not related to another cause. Blood clots in an unusual location (such as the liver, kidney, or brain) also may suggest an inherited clotting disorder.

If your doctor thinks that you have PE, he or she may recommend more tests, such as a lung ventilation perfusion scan (VQ scan). A lung VQ scan shows how well oxygen and blood are flowing to all areas of the lungs.

For more information about diagnosing PE, go to the Health Topics Pulmonary Embolism article.

How Is Deep Vein Thrombosis Treated?

Doctors treat deep vein thrombosis (DVT) with medicines and other devices and therapies. The main goals of treating DVT are to:

- Stop the blood clot from getting bigger
- Prevent the blood clot from breaking off and moving to your lungs
- Reduce your chance of having another blood clot

Medicines

Your doctor may prescribe medicines to prevent or treat DVT.

Anticoagulants

Anticoagulants (AN-te-ko-AG-u-lants) are the most common medicines for treating DVT. They're also known as blood thinners.

These medicines decrease your blood's ability to clot. They also stop existing blood clots from getting bigger. However, blood thinners can't break up blood clots that have already formed. (The body dissolves most blood clots with time.)

Blood thinners can be taken as a pill, an injection under the skin, or through a needle or tube inserted into a vein (called intravenous, or IV, injection).

Warfarin and heparin are two blood thinners used to treat DVT. Warfarin is given in pill form. (Coumadin® is a common brand name for warfarin.) Heparin is given as an injection or through an IV tube. There are different types of heparin. Your doctor will discuss the options with you.

Your doctor may treat you with both heparin and warfarin at the same time. Heparin acts quickly. Warfarin takes 2 to 3 days before it starts to work. Once the warfarin starts to work, the heparin is stopped.

Pregnant women usually are treated with just heparin because warfarin is dangerous during pregnancy.

Treatment for DVT using blood thinners usually lasts for 6 months. The following situations may change the length of treatment:

- If your blood clot occurred after a short-term risk (for example, surgery), your treatment time may be shorter.
- If you've had blood clots before, your treatment time may be longer.
- If you have certain other illnesses, such as cancer, you may need to take blood thinners for as long as you have the illness.

The most common side effect of blood thinners is bleeding. Bleeding can happen if the medicine thins your blood too much. This side effect can be life threatening.

Sometimes the bleeding is internal (inside your body). People treated with blood thinners usually have regular blood tests to measure their blood's ability to clot. These tests are called PT and PTT tests.

These tests also help your doctor make sure you're taking the right amount of medicine. Call your doctor right away if you have easy bruising or bleeding. These may be signs that your medicines have thinned your blood too much.

Thrombin Inhibitors

These medicines interfere with the blood clotting process. They're used to treat blood clots in patients who can't take heparin.

Thrombolytics

Doctors prescribe these medicines to quickly dissolve large blood clots that cause severe symptoms. Because thrombolytics can cause sudden bleeding, they're used only in life-threatening situations.

Other Types of Treatment

Vena Cava Filter

If you can't take blood thinners or they're not working well, your doctor may recommend a vena cava filter.

The filter is inserted inside a large vein called the vena cava. The filter catches blood clots before they travel to the lungs, which prevents pulmonary embolism. However, the filter doesn't stop new blood clots from forming.

Graduated Compression Stockings

Graduated compression stockings can reduce leg swelling caused by a blood clot. These stockings are worn on the legs from the arch of the foot to just above or below the knee.

Compression stockings are tight at the ankle and become looser as they go up the leg. This creates gentle pressure up the leg. The pressure keeps blood from pooling and clotting.

There are three types of compression stockings. One type is support pantyhose, which offer the least amount of pressure.

The second type is over-the-counter compression hose. These stockings give a little more pressure than support pantyhose. Over-the-counter compression hose are sold in medical supply stores and pharmacies.

Prescription-strength compression hose offer the greatest amount of pressure. They also are sold in medical supply stores and pharmacies. However, a specially trained person needs to fit you for these stockings.

Talk with your doctor about how long you should wear compression stockings.

How Can Deep Vein Thrombosis Be Prevented?

You can take steps to prevent deep vein thrombosis (DVT) and pulmonary embolism (PE). If you're at risk for these conditions:

- See your doctor for regular checkups.
- Take all medicines as your doctor prescribes.
- Get out of bed and move around as soon as possible after surgery or illness (as your doctor recommends). Moving around lowers your chance of developing a blood clot.
- Exercise your lower leg muscles during long trips. This helps prevent blood clots from forming.

If you've had DVT or PE before, you can help prevent future blood clots. Follow the steps above and:

- Take all medicines that your doctor prescribes to prevent or treat blood clots
- Follow up with your doctor for tests and treatment
- Use compression stockings as your doctor directs to prevent leg swelling

Contact your doctor at once if you have any signs or symptoms of DVT or PE. For more information, go to "What Are the Signs and Symptoms of Deep Vein Thrombosis?"

Travel Tips

The risk of developing DVT while traveling is low. The risk increases if the travel time is longer than 4 hours or you have other DVT risk factors.

During long trips, it may help to:

- Walk up and down the aisles of the bus, train, or airplane. If traveling by car, stop about every hour and walk around.
- Move your legs and flex and stretch your feet to improve blood flow in your calves.
- Wear loose and comfortable clothing.
- Drink plenty of fluids and avoid alcohol.

If you have risk factors for DVT, your doctor may advise you to wear compression stockings while traveling. Or, he or she may suggest that you take a blood-thinning medicine before traveling.

Living With Deep Vein Thrombosis

If you've had a deep vein blood clot, you're at greater risk for another one. During treatment and after:

- Take steps to prevent deep vein thrombosis (DVT). (For more information, go to "How Can Deep Vein Thrombosis Be Prevented?")
- Check your legs for signs of DVT. These include swollen areas, pain or tenderness, increased warmth in swollen or painful areas, or red or discolored skin on the legs.
- Contact your doctor right away if you have signs or symptoms of DVT.

Ongoing Health Care Needs

DVT often is treated with blood-thinning medicines. These medicines can thin your blood too much and cause bleeding (sometimes inside the body). This side effect can be life threatening.

Bleeding can occur in the digestive system or the brain. Signs and symptoms of bleeding in the digestive system include:

- Bright red vomit or vomit that looks like coffee grounds
- Bright red blood in your stools or black, tarry stools
- Pain in your abdomen

Signs and symptoms of bleeding in the brain include:

- Severe pain in your head
- Sudden changes in your vision
- Sudden loss of movement in your arms or legs
- Memory loss or confusion

If you have any of these signs or symptoms, seek medical care right away. If you have a lot of bleeding after a fall or injury, call 9–1–1. This could be a sign that your DVT medicines have thinned your blood too much.

You might want to wear a medical ID bracelet or necklace that states you're at risk of bleeding. If you're injured, the ID will alert medical personnel of your condition.

Talk with your doctor before taking any medicines other than your DVT medicines. This includes over-the-counter medicines. Aspirin, for example, also can thin your blood. Taking two medicines that thin your blood may raise your risk of bleeding.

Ask your doctor about how your diet affects these medicines. Foods that contain vitamin K can change how warfarin (a blood-thinning medicine) works. Vitamin K is found in green, leafy vegetables and some oils, like canola and soybean oils. Your doctor can help you plan a balanced and healthy diet.

Discuss with your doctor whether drinking alcohol will interfere with your medicines. Your doctor can tell you what amount of alcohol is safe for you.

Clinical Trials

The National Heart, Lung, and Blood Institute (NHLBI) is strongly committed to supporting research aimed at preventing and treating heart, lung, and blood diseases and conditions and sleep disorders.

Researchers have learned a lot about blood disorders over the years. That knowledge has led to advances in medical knowledge and care. However, many questions remain about various blood disorders, including deep vein thrombosis (DVT).

The NHLBI continues to support research aimed at learning more about DVT. For example, NHLBI-supported research includes studies that:

- Analyze genetic factors to determine the best doses of blood-thinning medicines for certain populations
- Explore whether a catheter procedure to dissolve deep vein blood clots can help improve outcomes for people who have DVT

Much of the NHLBI's research depends on the willingness of volunteers to take part in clinical trials. Clinical trials test new ways to prevent, diagnose, or treat various diseases and conditions.

For example, new treatments for a disease or condition (such as medicines, medical devices, surgeries, or procedures) are tested in volunteers who have the illness. Testing shows whether a treatment is safe and effective in humans before it is made available for widespread use.

By taking part in a clinical trial, you can gain access to new treatments before they're widely available. You also will have the support of a team of health care providers, who will likely monitor your health closely. Even if you don't directly benefit from the results of a clinical trial, the information gathered can help others and add to scientific knowledge.

If you volunteer for a clinical trial, the research will be explained to you in detail. You'll learn about treatments and tests you may receive, and the benefits and risks they may pose. You'll also be given a chance to ask questions about the research. This process is called informed consent.

If you agree to take part in the trial, you'll be asked to sign an informed consent form. This form is not a contract. You have the right to withdraw from a study at any time, for any reason. Also, you have the right to learn about new risks or findings that emerge during the trial.

For more information about clinical trials related to deep vein thrombosis, talk with your doctor. You also can visit the following Web sites to learn more about clinical research and to search for clinical trials:

- http://clinicalresearch.nih.gov
- www.clinicaltrials.gov
- www.nhlbi.nih.gov/studies/index.htm
- www.researchmatch.org

For more information about clinical trials for children, visit the NHLBI's Children and Clinical Studies Web page.

Links to Other Information About Deep Vein Thrombosis

NHLBI Resources

- Pulmonary Embolism (Health Topics)

Non-NHLBI Resources

- Deep Vein Thrombosis (MedlinePlus)
- Pulmonary Embolism (MedlinePlus)

Clinical Trials

- Children and Clinical Studies
- Clinical Trials (Health Topics)
- Current Research (ClinicalTrials.gov)
- NHLBI Clinical Trials
- NIH Clinical Research Trials and You (National Institutes of Health)

- ResearchMatch (funded by the National Institutes of Health)