

The background of the central section is a dark blue field with a microscopic view of blood. It shows several red blood cells as reddish-brown discs and a central, tangled mass of fibers representing a blood clot.

Blood Clots and Your Leg Veins

What You Should Know

OVERVIEW:

Blood clots are two words in healthcare that cause patients fear and concern when considering treatment options. However, information is power, and this ebook is written to bring understanding and awareness of blood clots so that, as a patient, you are more informed and better able to make decisions about your health care and lifestyle choices.

What Happens With a Blood Clot?

If you have a blood clot, it means that some of your blood has changed from liquid to a semi-solid state or a gel-like substance. Clotting can be a good thing, such as when you cut yourself and your blood clots to prevent you from losing too much of it. However, a blood clot can be dangerous if it develops inside of a vein. It isn't always possible for the blood clot to clear on its own with this type of vein condition and it may worsen the circulation or even travel to the lungs causing a life threatening condition.

Sometimes having a blood clot is a medical emergency. When a blood clot breaks free, it can travel to your lungs or heart and cause a condition known as pulmonary embolus (PE). Unfortunately, this can cause death or severe symptoms. It is a very serious condition and up to 10 percent of people who die in the hospital die of a PE.

Why Blood Clots Form in Veins

You may have an increased risk of developing a blood clot if you meet one of the three criteria identified by Dr. Rudolf Virchow. This German doctor developed the concept of Virchow's Triad in the 19th century. The triad refers to the increased risk of blood clotting among people with one of these three characteristics:

INNATE CLOTTING TENDENCY: Your body has an intricate system of clotting and anti-clotting systems. When these don't balance each other out, you can develop a blood clot or other serious bleeding or vein conditions. The best way

to find out if you have a problem with innate clotting tendency is for your health care provider to perform a simple blood test.

SLOW BLOOD FLOW: just like a river freezes after a lake, blood will clot more readily when it slows down. This is because part of the anti-clotting system of the body relies on fast blood flow.

VEIN INJURY: An injury to your veins is the body's natural stimulus for healing which always starts with a clot.

Specific Risk Factors for DVT Blood Clots

A GENETIC CLOTTING DISORDER IN YOUR FAMILY. If a close relative has a history of blood clots or if you are suspicious that you have one, ask your health care provider if blood testing is appropriate for you.

CERTAIN TYPES OF CANCER can increase the risk of DVT blood clots or, more concerning, a pulmonary embolus (PE). According to the Centers for Disease Control (CDC), the risk is highest within the first few months after receiving a diagnosis. Sometimes the DVT associated with the cancer precedes the diagnosis of cancer. The following types of cancer increase your risk of blood clots: brain, kidney, lung, lymphoma, myeloma, ovarian, pancreatic, stomach, and uterine. More advanced cancer stages come with an increased risk of blood clots and the specific type of treatment can make a difference. Ironically some cancer treatments such as chemotherapy and hormone therapy can increase risk due to the use of a special IV in your vein for treatments.



IMMOBILITY due to a long car ride, airplane trip, or extended periods of time lying in bed due to illness or injury. The hours of inactivity causes your blood to slow down and increases the risk of clotting.

OBESITY OR OVERWEIGHT CONDITION. Excess weight puts pressure on your pelvic veins, which in turn can cause your blood to flow too slowly from your legs to your heart.

PREVIOUS DIAGNOSIS OF DVT OR PE. This can happen when slow blood flow is caused by DVT scarring or narrowing of the vein, or an increased blood clotting tendency. If you have DVT, the risk of developing it again after one year is 15 percent. The risk at 10 years is 40 percent.

SMOKING AND USE OF ORAL CONTRACEPTIVES. We list these two risk factors together because they are small on their own. However, the combination - smoking while using birth control pills - can greatly increase your risk of blood clots.

STAGNANT BLOOD FLOW caused by chronic venous insufficiency (which includes varicose veins and vein reflux) can cause a superficial blood clot which can move into the deep veins, though DVT is uncommon.

SURGERY PERFORMED ON YOUR ABDOMEN, ANKLE, HIP, KNEE, LEG, OR PELVIS. The common thread here is limited movement and activity due to post-surgical pain, healing time, and pain which restricts activity and can increase blood clot risk.

VEIN INJURY from a broken bone, contusion of a muscle, or any type of physical trauma to the area.

If you recognize any of the above risk factors or have already experienced them, speak with your health care provider about ways to decrease your risk. Common methods may include blood thinners, leg circulation pumps, or simply increasing physical activity.

How Do I Know if I Have a Genetic Blood Clotting Disorder?

Even if you have some risk factors and a first-degree relative who has a blood clotting disorder, it doesn't necessarily mean that you have a blood clotting disorder as well. To know this, you need to have blood tests performed that checks for this disorder. You should know that this test can be expensive, which means your insurance company may not cover it unless your health care provider presents proof that you have several risk factors. If you feel concerned about family members with a blood clot history, urge them to have a blood test performed as well. This can link the presence of a genetic blood clotting disorder between all family members. If a family member has a known blood clotting disorder, ask them specifically what it is and share this with your provider so that you can be tested as well.

Women who have had multiple miscarriages in the past may have a blood clotting disorder and not know it, most commonly Factor V Leiden mutation or Antiphospholipid Antibody Syndrome. Scheduling a blood test to check for the presence of a clotting disorder can pinpoint the source of the problem to help women have a successful pregnancy in the future as well as avoiding possible blood clots in the future.



When Should I Be Concerned That I May Get a Clot?

When it comes to blood clots, your overall risk increases the more risk factors you have. Your risk of developing a blood clot is higher with one risk factor than a person who doesn't have any. Risk also increases if you previously had DVT or superficial phlebitis. If you have, be certain to avoid other risks and speak to your healthcare provider about whether anticoagulation medication is appropriate.

The CDC states that six million Americans take anticoagulant medication to treat DVT, superficial phlebitis, and other vein conditions. The medication can significantly reduce your chances of developing a blood clot in the future. Some medications such as warfarin (coumadin) require close monitoring to ensure that your blood does not become too thin, while other newer - and significantly more expensive ones - do not require monitoring.

Benefits of Wearing Compression Stockings

As you consider solutions to reduce your risk of blood clots, don't forget about why blood clots occur - remember Virchow's triad mentioned earlier: (increased clotting tendency, slow blood flow and injury/trauma). When traveling for many hours in a car or plane, for example, get up and move around each hour if possible. If you can't get up and move around on the plane or stop for a break while driving, at least move your feet and legs while seated. This helps prevent your blood from moving too slowly.

HERE IS A SHORT LIST TO CONSIDER:

- Wear compression stockings
- Walk and move each hour
- If unable to walk, move your legs and feet hourly
- Use a compression pump if you are immobile
- Start blood thinners with your healthcare provider's recommendation
- Stop smoking and oral contraception use
- Achieve normal body weight
- Avoid high risk situations (major surgery, long trips, bed-rest)

If you're scheduled for surgery and know that you will remain inactive afterwards, ask your provider whether you require blood thinners. Blood thinners are considered standard treatment after any major surgery of the hip, abdomen, or knee, so your provider will understand. Leg and foot surgery doesn't have as high of a risk for blood clots, but it's still a good idea to discuss all risk factors with your provider and whether blood thinners after surgery is appropriate for you.

When you must remain inactive after surgery, wearing compression stockings helps to lower blood clot risk by reducing or eliminating stagnant blood. A home compression pump in addition to the stockings can help keep the blood moving and reduce risk of blood clots. Some but not all insurance companies cover at least some of the cost to rent or buy a unit. If insurance doesn't help, these devices are commonly available online for a reasonable price.

If you have one or more of the risk factors listed above, speak to your doctor about whether blood thinners (anticoagula-

tion) would benefit you. This is especially important if you have recently experienced injury or trauma, had surgery, or need to remain seated for hours while traveling.

When smoking and contraception use is the risk factor for a previous DVT or superficial phlebitis, most providers recommend smoking cessation and stopping oral contraceptives.

It's important not to confuse a blood clot with vein reflux. Symptoms of the latter typically include fatigue at the end of the day, an uncontrollable urge to move your legs at night (restless legs), leg cramps, and painful, achy legs. The best way to sort this out is with a free vein screening to assess for the presence of vein reflux.

To summarize, the best way to reduce your risk of blood clots is to understand what makes blood clot (Virchow's triad), to learn about your own risk factors and to minimize your risk factors. This also includes investigating your family history of blood clots.

How Do I know if I have a Blood Clot in my Veins?

When the blood flowing through a part of your body slows down, a clot can form around the vein valves, at the site of a vein injury or in a varicose vein. A blood clot causes swelling in the leg and can be associated with pain when it first develops. Unfortunately, some blood clots in the legs do not cause any symptoms and then abruptly break off and travel to the lungs causing a pulmonary embolus (PE). This can be a serious or even fatal event, so prevention is the most important strategy.

Blood clots in the legs can cause either a DVT blood clot or a superficial blood clot called phlebitis. Both caused by DVT typically produce pain, swelling, and redness. A blood clot in the lung, also known as pulmonary embolus, produces rapid breathing, chest pain, shortness of breath, fainting, and a fast pulse rate.

Arterial Blood Clots are Not the Same as Blood Clots in the Veins.

Atherosclerosis causing Peripheral Artery Disease (PAD) leads to clots in the arteries. This disease causes plaque to build on the walls of your arteries. Plaque forms from deposits of cholesterol, fats, and other substances in the foods you eat each day. When plaque grows large enough, it blocks blood flow through your arteries - small at first but it increasingly worsens as the plaque enlarges. If the plaque formation becomes inflamed, a blood clot in the artery can form if the formation ruptures. Once a clot is present, it can make the artery even narrower or prevent blood from passing through it altogether.

Symptoms of an artery blood clot depend on the artery affected: in an intestinal artery, it will cause abdominal pain; in the leg artery, it causes leg or foot pain or potentially amputation; in the heart artery, it causes chest pain or a heart attack; in the carotid artery to the brain, it causes a mini-stroke or stroke. When these symptoms develop suddenly, seek immediate medical help.



What Kind of Blood Clots are There in the Veins?

You can have a recent blood clot - known as acute, or a long-standing blood clot - known as chronic. If you have a continuous blood clot, it means that it started in one area of your body and extended as one continuous clot to the next area. These extensive continuous clots cause more problems because it is more difficult for the body to form bypass channels around the long area of blockage and the leg swells more dramatically. The most common places for this to occur include your calf, groin, knee, pelvis, and thigh.

The good news about recent blood clots is that they can dissolve with treatment and with few long term symptoms. Long-standing clots, unfortunately, will never disappear. That is because older blood clots cause inflammation that eventually leads to scar formation within your vein. Scar tissue inside of a vein causes it to shrink and can be a huge risk factor for decreased blood flow and future blood clots. When a blood clot does not completely disappear, blood flow is carried by natural bypass channels that your body forms as a countermeasure. These bypass channels usually reduce symptoms of leg aching and swelling but do not completely resolve them.

By knowing the symptoms of a blood clot, you're more likely to recognize when one occurs. Be sure to engage in physical activity daily and use compression stockings if you have one or more risk factors for blood clots. If you feel you have a high risk of developing a clot, speak to your healthcare provider about going on blood thinning medication.

Why is a Blood Clot in the Veins Dangerous and What is a PE?

A blood clot in the lungs is especially dangerous and can be fatal. Tragically, one-quarter of people with PE die with no previous warning signs. This makes knowing the risk factors of blood clots and paying attention to vein health even more important.

It's also possible to develop a mild case of PE. This occurs when a blood clot travels to the lungs and becomes stuck there. Because of this, the blood is not getting the oxygen it needs and the oxygen level of your entire body decreases. If you have a mild case of PE, it will show up as a decreased oxygen saturation level and increased respiratory rate. However, your blood pressure would remain normal. A larger PE causes low blood pressure, oxygen saturation, heart rate, and respiratory rate.

Doctors typically rely on a CT scan to make a positive diagnosis of PE. If you are worried that you may have a PE, it is a good idea to make sure the facility you're going to for testing has CT scanning available to avoid what could be a critical delay in diagnosis. If you have PE, your doctor will most likely start you on anticoagulant therapy to thin the blood with in the hospital or as an outpatient. Be sure to wear your compression stockings and walk as much as you can. Walking is a natural way to dissolve clots. Instead of struggling with putting on a compression wrap, another option is to use a CircAid wrap around your leg and close the Velcro bands to create compression.



If I Get a DVT Blood Clot, How is It treated?

A DVT occurs when the body's balance of clotting and anti-clotting is upset. The goal of treatment is to decrease the activity of the clotting system while increasing the anti-clotting system at the same time. Taking blood thinning medication helps to decrease the clotting tendency and allows the body's natural clot dissolving function to take over.

Warfarin and Coumadin are the most common blood thinners. Both require you to come in for regular blood tests and avoid certain foods that can interfere with how efficiently the medication thins your blood. Before you can start these drugs, however, you need to take Lovenox or Heparin for about a week to prevent additional clotting before the Warfarin or Coumadin starts to work.

Because the medication can be difficult to adjust, some people experience too much or too little blood clotting with Warfarin or Coumadin that can cause increased bleeding or a tendency to clot. Often, Lovenox or Heparin is used to provide blood thinning while Coumadin/Warfarin reaches the correct level. These medications require injections once or twice a day for the greatest impact. Since Heparin has a higher risk of severe reactions, many doctors prefer to use Lovenox. However, Lovenox is more expensive. This can make it challenging to receive insurance approval. The short-term risk of bleeding with Lovenox is quite low.

You also have the option to take a new type of oral

anticoagulant that doesn't require blood monitoring. Most patients tolerate them well, but they are expensive because they're new and require prior authorization from most insurance companies. Brand names for these new oral anticoagulants include Eliquis, Pradaxa, and Xarelto. Although there's always a small risk of bleeding, studies on these drugs have indicated an overall positive patient experience so far. Thrombolytics, the medical name for clot dissolvers, can cause uncontrolled bleeding and are generally not recommended for DVT therapy.

If I Get a DVT Blood Clot, Will It Go Away?

The outcome of your blood clot depends on your level of physical activity, whether you take blood thinners and whether you have a blockage somewhere in your vein. It's important to understand the series of events that occur when a blood clot develops inside a vein. First, the vein clots and begins filling up. The valves of the vein close as well. Next, the blood clot produces inflammation and these symptoms:

- Pain and local tenderness, which may indicate DVT or superficial phlebitis
- Redness
- Swelling
- Scar tissue development as the inflammation starts going down
- Narrowing of the vein with a lot of scar tissue that can cause slow blood flow in the future even if the blood clot dissolves
- The vein valves become dysfunctional after the blood clot dissolves, often resulting in a severe case of vein reflux in the deep veins of your body.



What is Post-thrombotic Syndrome?

This means that your veins have significant scarring and the blood flows through them slowly due to the narrowing caused by scar tissue. Because the vein valves no longer work, you're left dealing with stagnant blood and/or vein reflux. Unfortunately, no treatment currently exists for these issues in the deep veins except daily use of compression stockings and a leg pump.

The most common symptoms associated with post thrombotic syndrome after a DVT are: stagnant blood and vein reflux including skin sores, skin discoloration, aching legs, and significant swelling. While other symptoms may show up right away, it can take one to two years to start seeing the skin sores. At present, the only effective treatment for post-thrombotic syndrome is to wear compression stockings daily.

How Can Compression Stockings Help?

Be sure to choose the highest compression you can tolerate since it is necessary to counteract the abnormally high pressure inside the vein. Compression can range from 20 to 50 mmHg for advanced cases. We advise starting with 20-30 mm Hg knee high and increasing to 30-40 mmHg or higher if legs still have symptoms. We reserve 40-50 mmHg for people who have skin ulcers at their ankles with this condition. Make sure you get new stockings every 3 months or so as they stretch out and become less effective. Your vein care specialist should be able to advise you on which one is right for you.

Some patients with post thrombotic syndrome experience severe leg swelling or skin ulcers not relieved by com-

pression stockings, and these people benefit from use of a leg compression pump for an hour each day.

In Summary

While I have written this ebook from my perspective as a vascular surgeon with a goal to provide information and answer questions about blood clots, it will never be a replacement for a conversation with your personal health care provider. Remember that each individual is different based on symptoms, family history, and lifestyle choices. Your situation can be as unique as you are. What matters is that you pay attention to the warning signs, stay in communication with your health-care provider if you are in a higher-risk category and make good lifestyle choices to optimize your vein health.

