

Spring 2011

Keeping in Circulation

The official magazine of the Vascular Disease Foundation®

**WHEN IT
COMES
TO DVT,**

knowledge
is power



Vascular Disease
Foundation®



Anton Sidawy, MD, MPH
President
Vascular Disease Foundation

Dear Readers,

Welcome to another edition of The Vascular Disease Foundation's popular *Keeping in Circulation* magazine! We are delighted to offer this "DVT Awareness" issue, which focuses on many facets of DVT, or deep vein thrombosis. With over one million Americans suffering from DVT each year in the U.S., VDF continues to raise awareness of DVT, which is a preventable and treatable condition.

March is also DVT Awareness month, and we are grateful to those women who have participated in the "This Is Serious" educational campaign for sharing their stories with us (see story on page 6).

We are pleased that many national experts in the field of venous disease research and management were interviewed for these articles. Many of which shed light on topics such as new anticoagulant medications that offer an alternative to the traditional treatment with warfarin. With 60 percent of Americans affected by venous disease, you can read and share information with your friends about treatments for venous disease and related conditions.

While most patients who suffer from DVT recover completely, there are others that do not and experience complications such as post-thrombotic syndrome, or PTS. PTS is a condition that is chronic and lifelong, causing a variety of symptoms and in some patients, disability. See page 14 to learn more about PTS.

This issue also features an article on DVT and pregnancy. VDF's This is Serious campaign educates women about DVT, and this issue is helping to spread educational information about DVT and how it affects mothers during pregnancy and after delivery. See page 12 for more on this topic.

This April ends my term as President of the VDF board of directors. It has been my privilege to serve on this growing and dynamic organization. While I will continue to serve on the board of directors, I will be passing the gavel to Robert McLafferty, MD. I want to personally thank you for your past support of VDF and ask for your continued support as the organization continues to grow.

Thank you!

Sincerely,

A handwritten signature in black ink that reads "Anton N. Sidawy". The signature is written in a cursive, flowing style.

Anton N. Sidawy, MD, MPH
President
Vascular Disease Foundation

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“In Memory of” and “In Honor of” Envelopes Available

VDF has created a preprinted envelope in response to request from supporters who have contributed “In Memory of” and “In Honor of” a loved one. This will simplify and expedite your desire to memorialize or honor a special person through a donation to VDF. If you would like to receive these special envelopes, call us at (888) VDF-4INFO or by e-mail at info@vdf.org. These can also be used for a wedding or anniversary gift donation.

Excellence in Care

Recognize a caregiver who provides exceptional care with the Excellence in Care Award. Send us a note or e-mail with a tax-deductible donation of \$50 or more telling us who you are honoring and why he or she deserves the recognition. Nominees can be any medical professional who has helped you or your family or has shown special kindness which you feel deserves recognition.

Ask the Expert Live Chat

VDF is proud to offer live online chats with a health care professional about different areas of vascular disease. Chats occur during the second Tuesday of the month at 4 p.m. EST/3 p.m. CST/2 p.m. MST. Join us on the following dates to chat live with a medical professional:

April 12 — John H. Rundback, MD answers your general questions about vascular disease

May 10 — Michael Jaff, MD answers your general questions about vascular disease

June 14 — Rishi Gupta, MD answers your general questions about carotid disease and stroke

Can't sit in on a live chat? E-mail your questions to info@vdf.org up to 30 minutes prior to each chat or view the transcripts online. For transcripts and log-in information, visit <http://www.vdf.org/interactive/ask.php>.

New HealthCasts

The Vascular Disease Foundation is proud to continue its audio HealthCasts that cover all aspects of vascular disease. Our guests are the leading scientific and clinical experts in their respective fields. For more information or to download and listen to VDF HealthCasts, visit www.vdf.org/interactive/podcasts.

Here are the latest HealthCasts:

Episode 38: Breakthroughs for PAD Awareness
The topic for this episode is the several recent and important publications about peripheral arterial disease that will most certainly translate to a benefit to affected individuals.

Episode 39: Venous Disease and Compression Therapy
The topic for this episode is venous disease and its treatments, including compression therapy.

Episode 40: More About Venous Disease and Its Treatment
This episode continues the discussion venous disease and its treatments, including compression therapy.

Social Media

VDF now has interactive pages on Facebook, Twitter and YouTube! Visit us online at and stay in touch:

Facebook: [VDFMan](https://www.facebook.com/VDFMan)

Twitter: Follow us at: [http://twitter.com/vdf](https://twitter.com/vdf)

Watch us on YouTube:

<http://www.youtube.com/VascularDiseaseFdn>

DVT Risk Assessment Quiz

Do you know your risk of having deep vein thrombosis (www.venousdiseasecoalition.org/diseaseinfo/dvt/index.php) and pulmonary embolism (www.venousdiseasecoalition.org/diseaseinfo/pe/index.php)? Every year more than 350,000 Americans are affected by DVT and PE. Many times these serious blood clots are not diagnosed because the risk factors, signs and symptoms are not known.

Take the simple online risk assessment to find out if you're at risk: www.venousdiseasecoalition.org/resources/risk-quiz.php.

Excellence in Care Winner



In 2002 Dr. Garnet Craddock was the driving force behind a campaign to provide a wound care center at Piedmont Newnan Hospital. He was instrumental in bringing in hyperbaric treatments to the area. He has impacted this community in a very positive way through innovation, care and a passion for venous and wound care.

Dr. Garnet Craddock graduated from Clemson University in 1980 and earned his medical degree from Medical University of South Carolina in 1984. He completed a general surgery internship and residency program at Wake Forest University Medical School in 1990. Dr. Craddock is board certified in general surgery by the American Board of Surgery and is a fellow of the American College of Surgeons. He is a member of several organizations and has published articles and made presentations at medical conferences and to medical societies on a wide variety of surgery and vascular disease topics. Dr. Craddock has been in practice at PAPP Clinic in Newnan for 20 years and has been the Director of the Vascular Lab for 6 years. Although he has been treating venous issues for over 16 years, he decided to open Southern Vein Care in March 2010 specializing in the treatment of vein disease utilizing the most advanced techniques in an outpatient setting.

Online patient support group community

VDF's Inspire network is an online community designed to be a safe place for you to discuss your health with like-minded men and women. Topics include, abdominal aortic aneurysm, Buerger's disease, carotid artery disease, congenital vascular malformation, deep vein thrombosis, lymphedema, PAD, portal hypertension, raynaud's disease, thrombophilia, varicose veins and vasculitis. Visit <http://vdf.inspire.com>.

March is DVT awareness month

Learn the warning signs and symptoms of deep vein thrombosis (DVT) and pulmonary embolism (PE) at www.vdf.org or call us to receive your free copy of our "Focus on Blood Clots" brochure. Check our Web site for more information at www.vdf.org/diseaseinfo/dvt.

May is stroke awareness month

Learn the symptoms of stroke on VDF's Web site in the disease section or by listening to HealthCast episode #10. Also, join neurologist Dr. Rishi Gupta on June 14 for our Ask the Expert Live Chat as he answers your general questions about stroke and carotid disease.

Seeking Patient Ambassadors

Become a VDF ambassador and be the first group trained to promote vascular disease awareness in your community, provide support to others impacted by vascular disease and an advocate to help VDF to reduce death and disability from vascular disease. Only 12 people will be selected to help us.

For more information and to complete an application, go to www.vdf.org/resources/ambassadors.php or by calling VDF at **888.VDF.4INFO (888.833.4463)**. Applications are due April 30.

When it comes to DVT, knowledge is power



Deep vein thrombosis (DVT) occurs when a blood clot, or thrombus, develops in the large veins of the legs or pelvic area, or less commonly in the arms or other locations. Only half of those with DVT will have typical symptoms of limb swelling and pain. With prompt diagnosis and treatment, the majority of DVTs are not life threatening. However, if a blood clot breaks loose, it can travel through the heart to the lung arteries, a condition known as a pulmonary embolism (PE). If the traveling clot, called an embolus, clogs one of the main lung arteries, it can be fatal in some cases.

Anyone may be at risk for DVT, but the more risk factors you have, the greater your chances are of developing DVT. Knowing and managing your risk factors can prevent DVT and PE.



Traci's story

Risk factors: Personal history of a clotting disorder, family history of DVT

It was Christmas, and I was 25 years old at the time. Throughout the holidays, I sat at home feeling as though my life was slowly draining away. I slept sitting up, because I couldn't breathe lying down. Finally, just before dawn the morning after Christmas, I called my mother and asked her to take me to the Emergency Room (E.R.). A test later revealed that several large blood clots from the deep veins around my abdomen had broken apart and traveled to my lungs—causing a pulmonary embolism.

Flashback to the fall, to a doctor who dismissed my symptoms. Another doctor, an ultrasound, a wrong diagnosis—muscle strain, he said. Later, an MRI showed a herniated disc and sciatica. Except that wasn't the reason for my symptoms. Then drugs, and the increasing pain despite them, followed by more E.R. visits. Then Christmas.

I'm lucky to be alive, because I knew I was on my last breath. If I could offer just one thing to help other people, especially those who have Factor V Leiden (an inherited clotting disorder) like me, I'd want them to know what DVT looks and feels like. Please, be aware that pain, redness or swelling in your legs can be symptoms of DVT. Pregnancy also increases the risk of blood clots. Because I knew this, I was able to be preventive during my own pregnancy with anti-clotting drugs. Learn and know the signs and symptoms of a blood clot, because DVT can be prevented. But if you don't catch it in time, it can travel to your lungs and be fatal.



Debi's story

Risk factors: Surgery, hormone replacement therapy, sedentary lifestyle

You can watch video of Debi's and Traci's stories and others at www.ThisIsSerious.org

I was taking a nap one day after church, when I was awakened by a sharp pain in my left leg. I thought it was a charley horse. But when the pain moved into my right leg, I knew it was something much worse. It was the most intense pain I've ever felt, and I couldn't control my legs. I tried to make it down the hall to the nearest phone, but I felt a huge wave of heat come over me, and I passed out. Next thing I knew, I felt my dog Mackenzie's wet nose on my face. I finally crawled to the phone to call 911. I'm positive she saved my life.

In the Emergency Room (E.R.), the doctors told me I had suffered a PE. I was shocked. I had no idea what PE was, let alone learn that the clot circulated through my legs and landed in my lung. I was very scared. They gave me enoxaparin shots, then I was on warfarin, blood thinners, for seven months.

My doctor told me the DVT was probably caused by a number of factors, including the hormone replacement therapy I'd been on for

a few years following a hysterectomy. Also because I lived a pretty sedentary lifestyle with a desk job that kept me sitting almost all day. I had recently flown across the country from Baltimore to Seattle, and didn't get up to stretch my legs the whole flight. And I'm a cancer survivor and had two knee surgeries, which put me at higher risk for DVT, though nobody told me that at the time.

I never thought something like this could happen to me. I'm extremely grateful to be living and enjoying my time with family and friends. I now make an effort to exercise more and move around at the office, like standing during conference calls and doing stretches to keep circulation flowing.

DVT and PE can strike anyone, anytime. Know your medical history. And above all, know your risk, for developing either disorder.

Am I at risk?

Anyone may be at risk for DVT, but the more risk factors you have, the greater your chances are of developing DVT. Knowing your risk factors can help you prevent DVT:

- Hospitalization for a medical illness or any illness
- Recent major surgery (especially orthopedic surgery) or injury or trauma
- Personal history of a clotting disorder or previous DVT
- Increasing age
- Cancer and their treatments
- Pregnancy and the first 6 weeks after delivery
- Hormone replacement therapy or birth control products
- Family history of DVT
- Extended bed rest
- Obesity
- Smoking
- Prolonged sitting when traveling (longer than 6 to 8 hours)
- Leg brace or cast, non-weight bearing after leg fracture or surgery

DVT symptoms and signs

The following are the most common and usually occur in the affected limb:

- Swelling of the limb
- Unexplained pain or tenderness in the affected limb

- Skin that may be warm to the touch
- Redness of the skin

Since the symptoms of DVT can be similar to other conditions, like a pulled muscle or strain, this may result in a delay of the correct diagnosis. Furthermore, some people with DVT may have no symptoms at all.

How can I prevent DVT?

How can I prevent DVT and other vascular problems?

- Stay active, walking helps with blood circulation and promotes weight loss
- STOP smoking
- Maintain a normal body weight and eat a healthy diet
- Discuss risks of birth control or hormone replacement therapy with your health care provider
- If you are hospitalized for any medical or surgical condition, ask the doctor what he or she is planning to do to decrease your risk of DVTs and PEs
- Find out if there is any family history of DVT or abnormal blood clotting. If so, discuss any tests or steps you should take with your health care provider
- If you take long airline or auto trips, get up (or out of your car) and walk every hour or so, and tighten the calf muscles by flexing your foot and raising on your toes 10-15 times each hour. Additionally, avoid alcohol, tight-fitting clothes and drink plenty of fluids. Ask your health care provider if any

other precautions should be taken for long travel, such as wearing elastic compression stockings.

- Follow your health care provider's instructions to keep any medical conditions under best control
- If you had a DVT in the past or had abnormal clotting, inform your doctor or surgeon

Knowing and understanding what DVT is and how to prevent it can save your life. Knowledge is power when it comes to DVT. Learn about DVT, the risk factors and signs and symptoms. More information is available on our Web site, www.vdf.org, or visit www.ThisIsSerious.org.

The "This Is Serious" educational campaign was created by the Vascular Disease Foundation in cooperation with the Center for Disease Control and Prevention (CDC). The campaign is targeted to educate women about DVT. While men and women are at equal risk for DVT, there are certain times during a woman's lifetime that put her at greater risk because of hormones.

The "This Is Serious" education campaign features real-life stories of women who have survived DVT and PE and are dedicated to helping educate others. The site features these stories, videos, a risk assessment quiz and more. Read about DVT, learn about it and help us spread the word and help save a life.

For more information about DVT/PE, visit www.vdf.org or www.ThisIsSerious.org.

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This screens for the most common irregular heart beat, which increases the risk of stroke 5-fold.

3 Abdominal Aortic Aneurysm Screening

Screens for the existence of an aneurysm in the abdominal aorta. The vast majority of people who have an aneurysm have no symptoms.

4 Peripheral Arterial Disease Screening

It is 4-5 times more likely that you will die of heart disease if you have peripheral arterial disease.

To find a screening near you, call (800) 772-8390 or go to LifeLineScreening.com

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All tests are for screening purposes only. You should consult with your personal physician regarding your screening results. Life Line Screening does not participate in the Medicare program and the cost of our screening services is not generally covered or reimbursable by Medicare. Life Line Screening does not file insurance claims and the cost of our screening services is your responsibility. Screenings in Kansas are performed by Life Line Screening of America, LLC on behalf of Life Line Screening Physicians, P.A. In some states, including Texas, physician authorization is required. A Life Line Screening affiliated physician will provide authorization for you if you qualify. Screenings in California are provided by Life Line Mobile Screening.



CLOT BUSTERS!

Innovations in endovascular therapy may revolutionize standard care for acute deep vein thrombosis

By Susan L. Comer

Technology at its best improves quality of life. A powerful illustration of that principle may be in store for the hundreds of thousands of Americans who develop deep vein thrombosis (DVT), a condition resulting when a blood clot forms in a deep vein, usually in the leg.

Since the 1960s, drug therapy for acute DVT patients has consisted almost exclusively of anticoagulants, or blood-thinning drugs. Such drugs are effective at preventing the most dangerous consequence of DVT, pulmonary embolism, which occurs when a clot breaks loose, travels through the bloodstream, and lodges in a major organ such as the heart or lungs. They also prevent new clots from forming.

However, as blood-thinning drugs do not dissolve the clot, it may permanently damage the venous valves, causing another debilitating and often-irreversible complication of DVT known as post-thrombotic syndrome (PTS). PTS, characterized by leg pain, heaviness, fatigue, and swelling, usually on a daily basis—and, in some cases, venous ulcers (open sores)—develops in 25 to 50 percent

of DVT patients despite the use of blood-thinning drugs. But, notwithstanding its potentially negative impact upon a patient's mobility, PTS is often ignored.

"PTS is something that patients aren't really even [generally] told about," says Suresh Vedantham, MD, a practicing interventional radiologist and Professor of Radiology and Surgery at Washington University School of Medicine in St. Louis. "Yet it is a leading determinant of their long-term quality of life."

Next-generation innovation

While thrombolytic agents—clot-busting drugs that dissolve clots and, thus, may prevent PTS—have been available for DVT patients since the 1990s, they are not without drawbacks. Specifically, they require 24 to 48 hours of infusion in the hospital and, because substantial amounts of the powerful drugs are administered, profuse bleeding is a significant risk. Therefore, thrombolytic agents have typically been deemed appropriate only for severe cases of acute DVT, that is, extensive clots at or above groin level.

But with the advent of newer pharmacomechanical catheter-directed thrombolysis (PCDT), the paradigm for treating DVT patients may experience a considerable shift. The AngioJet and Trellis devices, using techniques known as "Powerpulse" and "Isolated Thrombolysis," respectively, deliver clot-busting treatment directly into the clot via image-guided catheters—faster and more efficiently.

"Those two techniques enable you to remove or degrade the clot out in one procedure in many patients, for example, in two hours as opposed to 30 hours," says Dr. Vedantham, "and that has some advantages in terms of using lower drug doses. It may be a safer technique and it's certainly easier to undergo one procedure and call things done rather than to have a catheter in your leg for, say, a day and a half."

According to Dr. Vedantham, preliminary research suggests that patients who receive clot-busting treatments may be less likely to develop PTS. However, because the procedures are invasive, costly, and may still promote bleeding in a small percentage of patients, controversy exists among physicians as to whether PCDT should routinely supplement blood thinners as part of standard care for DVT patients.

Consequently, Dr. Vedantham offers the following advice to patients with acute DVT: "If they have a blood clot—and especially if they have a major blood clot," he says, "it is worth asking their physician whether some type of clot-busting treatment may be appropriate." If compression stockings are not prescribed, he says, ask about those as well.

"Some physicians are not going to automatically mention these treatments when patients first present with extensive DVT," says Dr. Vedantham, "but the patient has a two-week opportunity to have the clot dissolved. Beyond a few weeks, that clot is not going to dissolve and the patient may be left with permanent damage to the vein."

Groundbreaking trial

Resolution to the pivotal debate on use of clot-busting drugs is now being sought through a \$10 million randomized, controlled clinical trial known as the ATTRACT (Acute Venous Thrombosis: Thrombus Removal with Adjunctive Catheter-Directed Thrombolysis) Study of which Dr. Vedantham is the national principal investigator. Funded by the Heart, Lung, and Blood Institute of the National Institutes of Health and endorsed by the U.S. Surgeon General, ATTRACT will enroll almost 700 patients for two to three years at 50 sites across the country, including the clinical coordinating center at Washington University School of Medicine.

In the parallel, two-arm study, half the patients will receive standard care only—blood-thinning drugs and prescription compression stockings. The other half will receive standard care plus clot-busting drugs. ATTRACT's multidisciplinary team is analyzing such issues as safety, cost-effectiveness, symptom relief and, of course, the ultimate question: Does injection of clot-busting drugs prevent acute DVT patients from developing PTS?

If positive, the study could change a standard of care in place for half a century and, more importantly, improve quality of life for countless thousands diagnosed with acute DVT. ■

To learn more about the ATTRACT trial, visit www.attract.wustl.edu. And to find out if you qualify, contact (or have your doctor contact) the ATTRACT Study Clinical Coordinating Center at 1-866-974-CLOT (2568) or attract@mir.wustl.edu. Also visit www.vdf.org/clinical for more information.

According to Dr. Vedantham, preliminary research suggests that patients who receive clot-busting treatments may be less likely to develop PTS.

DVT and pregnancy

What new and expectant mothers need to know

By Ginny Gaylor

Every year about one million Americans are affected by deep vein thrombosis, or DVT. A small percentage of people with DVT will be pregnant women. In fact, about one in 1,000 pregnant women will develop DVT or a pulmonary embolism (PE). These conditions occur twice as frequently in women after giving birth.

What are DVT and PE?

DVT is the occurrence of a blood clot in the large veins of the legs or pelvic area. It can affect men and women, as well as all ethnic groups and social levels. It is more common in the elderly, but people of any age can develop DVT. While some DVTs may not hurt, others can be very painful. If discovered and treated quickly, most DVTs are manageable.

A clot that breaks free is called an embolus. If an embolus travels from the legs or pelvis to the lungs, it is called a pulmonary embolism (PE). If a PE is not diagnosed and treated, it can be fatal.

While DVT is most often seen in people over 40, women who are pregnant or who recently had a baby are at an increased risk. According to Dr. Christina Scifres, an assistant professor at the University of Pittsburgh and a specialist in maternal fetal medicine, pregnant women have an increased predisposition to blood clots secondary to increases in clotting factors as well as other factors associated with pregnancy and delivery.

“But it is still a very uncommon complication of pregnancy,” she explains.

After having a baby, Dr. Scifres notes that changes in the blood clotting can persist for up to six weeks. This increases their chance of developing DVT once they have given birth. Women who have had a C-section are especially at risk.

Symptoms and risk factors

The most common symptoms of DVT are swelling, pain or redness in the legs. Dr. Scifres urges a pregnant woman or new mother who notice these symptoms to contact their doctor immediately.

Symptoms of PE include chest pain, shortness of breath, a rapid pulse or a cough. If you notice any of these symptoms, it is important to contact your doctor immediately.

Pregnant women who smoke or are overweight have an increased risk of developing DVT. If you have a family history of blood clots, it is important to inform your doctor. An extended period of bed rest can also raise your risk of DVT.

Dr. Scifres recommends being aware of your family history. “Talk to your doctor about your family history and stay active,” she says. She adds that if pregnant women are placed on bed rest, it is important to discuss ways they can reduce their risk of blood clots with their doctor. “Also find out what the appropriate amount of activity is for you,” Dr. Scifres says.



Diagnosis and treatment

If you or your doctor suspects a DVT, your doctor will do an ultrasound of your legs to look for a blood clot. You may also have a CT scan of your chest to see if a clot has broken free from the legs or pelvic area and become a PE.

Dr. Scifres understands that during pregnancy, swollen legs and aches and pains are common. "But if you are having symptoms you are concerned about, especially swelling in your extremities or you notice an acute change, get evaluated by your doctor," Dr. Scifres says. "It is OK to ask, 'Could this be a blood clot? Do I need more testing?'"

Should you develop DVT during or after pregnancy, your doctor may recommend drugs to thin your blood. Blood thinners will prevent the existing clot from growing and new clots from forming. Your doctor will monitor your blood levels closely during this time.

Regular exercise is one method for preventing DVT. Stretching and moving the legs is very important, especially if you sit at a desk all day. Smoking during pregnancy is dangerous for your baby, but it also increases your risk of blood clots. If you smoke, it is important to stop to help prevent DVT. ■

To learn more about women and DVT, visit www.ThisIsSerious.org. This is Serious™ is a national campaign to drive awareness and action around the prevention of deep vein thrombosis (DVT) and pulmonary embolism (PE) in women. It was developed by the Vascular Disease Foundation and Spirit of Women®, in partnership with the Centers for Disease Control and Prevention (CDC).

keeping
in circulation

DVT and PTS

What you need to know

By Erica Stacy

At times, as adults, navigating employment, finances and health care seems a lot like swimming through a bowl of alphabet soup. IRA, W-2, SSI, MRI, CT, PT, BSN, MD ... deciphering the meanings behind each combination of letters often feels like unlocking a secret code, especially when it comes to managing good health.

Take DVT and PTS.

Deep vein thrombosis

DVT, deep vein thrombosis, occurs when a blood clot forms in a vein deep in the body. Blood clots are the result when blood in the body gets thick and forms a plug. DVT is usually found in the lower leg or thigh; however, it can happen in other parts of the body. For example, clots in the arm veins can occur in patients with indwelling catheters for delivery of chemotherapy or other drugs. If part of the clot breaks off, it can travel through the bloodstream

through heart and into the lungs. This is known as pulmonary embolism (PE); which can be life threatening. In fact, between 100,000 and 180,000 people in the United States die from PE annually.

Every year up to one million Americans suffer from DVT; yet, medical experts agree that the number with the disease is likely much greater. Because the symptoms of DVT can overlap with those of other conditions, many DVT are never diagnosed.

Symptoms of DVT include swelling in the affected area, pain or tenderness, increased warmth and/or red or discolored skin.

The causes of DVT are varied and can be hereditary or acquired. It can happen as the result of stagnation of the blood in the leg veins because of immobility due to medical illness, plaster immobilization after injury or fracture. It may also result from circulation problems related to certain diseases (such as cancer, congestive heart failure and others) or even after traveling long distances. Pregnancy and some medications such as birth control pills and hormone therapy also contribute to the development of DVT.

DVT may be treated with special medicines (anticoagulants) commonly known as blood thinners. In some cases, tubes can be inserted in the vein to deliver clot-busting medications to break up the clot. Rarely, a filter is surgically inserted into a vein to catch pieces of the clot so they won't travel to the lungs. Physicians may also recommend compression stockings to keep blood from pooling and clotting in the legs.

Post-thrombotic syndrome

Although many people with DVT fully recover after treatment, others may be left with problems in the affected limb. This is called post-thrombotic syndrome, or PTS. PTS is a chronic, lifelong condition. According to Susan R. Kahn, MD, of Jewish General Hospital in Canada, "Symptoms of PTS may come and go over time, but it often results in prolonged suffering and disability for patients. Severe PTS can cause skin ulcers that are painful and difficult to treat."

When a clot forms in a vein, the valves may be damaged by the clot or surrounding inflammation. This may affect the flow of blood from the leg back to the heart, causing increased venous pressure in the leg.

The symptoms of PTS include:

- Leg pain, aching or tiredness in the affected limb
- Swelling
- Cramping
- Itching
- Discoloration

- Dry flaking skin or redness
- Hardening of the skin
- Ulceration

PTS symptoms vary from person to person. Usually, the problems get worse with activity and improve with rest and elevation.

Who is most at risk of developing PTS?

"It's hard to predict which patients who have had DVT will develop PTS," says Kahn. "But there are some factors that seem to increase an individual's risk, such as DVT higher up in the leg veins, obesity and a previous DVT occurring in the same leg. Age and less effective blood-thinning treatments are also linked to PTS."

Currently, little has been proven regarding PTS prevention; however, researchers are working hard to change that. Wearing compression stockings daily for two years after

PTS symptoms vary from person to person. Usually, the problems get worse with activity and improve with rest and elevation.

a DVT has shown some success. Preventing recurrence of DVT is also important.

"Treatment for PTS are limited," explains Kahn. "Elevating the legs and using compression stockings may reduce swelling and pain. Physicians may also prescribe medications to manage discomfort and inflammation. Intermittent compression devices that are worn outside the leg, periodically squeezing it, have had some effect in severe PTS cases. Sometimes, surgical or endovascular vein opening procedures help those patients whose veins are chronically blocked."

Kahn recommends that patients pay attention to their bodies before they get sick. "When you know what is normal for you when you are healthy, it is easier to recognize a problem. Don't put off seeking help for something out of the ordinary. What seems to simply be a nagging pain might actually be a sign of something more serious. As always, maintain a relationship with your primary care provider. He or she is your best advocate for finding problems early and seeking effective treatment. It's the best prevention strategy available." ■

A prescription primer

Understanding the medications doctors prescribe for blood clots

By Jennifer Sellers



There are some drugs that are household names, such as Alka-Seltzer, an over-the-counter (OTC) antacid. Others, like the prescription antidepressant Prozac, have unique cultural recognition. But beyond a select handful of well-known pharmaceutical remedies, the world of medications (their names, uses, dosages, side effects and interactions) can be difficult to understand—even with a doctor’s or pharmacist’s help.

To help you better navigate your medicine cabinet, we’re breaking down blood clot medication details for you.

The three categories of blood clot drugs

If you have a condition like a blood clot, you may not consider that there are a number of potential drugs that can treat that one bodily disorder.

And the exact medication (or medications) your doctor prescribes for you depends on both your personal health history and the type of clot you have. “There is not a one-size-fits-all drug for blood clots,” says Jeffrey Weitz, MD, professor of medicine, biochemistry and biomedical sciences at McMaster University in Hamilton, Ontario, and executive director of the Thrombosis and Atherosclerosis Research Institute, which is also in Hamilton. “When it comes to what is prescribed, it always depends on the patient.”

Dr. Weitz goes on to explain that there are three categories, or classes, of blood clot medications. Each type of drug has a different job.

Antiplatelet drugs: These drugs have a preventive effect on blood clots because they keep platelets from clumping. Platelets are disc-like fragments in the blood that adhere to the damaged vessel wall and to one another. While they do serve a positive role in the body by helping it heal wounds, platelets can also lead to blood clots. Platelet clumping is the first step in blood clot formation.

“If you have plaque in your coronary artery or your brain artery and that plaque ruptures, you can have explosive platelet clumping at that site,” explains Dr. Weitz. “That’s where antiplatelet drugs come in. They will keep those platelets from clumping there.”

The antiplatelet drugs most people are aware of are Aspirin (over the counter) and Plavix (prescription), also known as clopidogrel, but there are several drugs in this class that your doctor may recommend.

Anticoagulants: While platelet clumps are a component of blood clots, another material in the body, called fibrin, helps bring it all together. “What ties those platelet clumps together is a strand-like material called fibrin,” says Dr. Weitz. “Anticoagulants are another method of preventing blood clot formation, but instead of inhibiting platelet clumping, this type of drug prevents the formation of fibrin, which is what helps those platelets make a stable clot.”

Anticoagulants are more popularly known as “blood thinners.” The most commonly known anticoagulant is warfarin (brand-name Coumadin). It has been a standard treatment for blood clots for almost 60 years. However, warfarin can interact negatively with a number of different medications, which can be problematic for both the patient and the prescriber. Fortunately, Dr. Weitz says that there are numerous new anticoagulants on the market that aren’t as susceptible to interference from other medications in

COMMON BLOOD CLOT DRUGS BY CLASS

Antiplatelet drugs

Aspirin
Clopidogrel (Plavix)
Cilostazol (Pletal)
Tirofiban (Aggrastat)
Dipyridamole (Persantine)
Aggrenox (dipyridamole plus aspirin)

Anticoagulants

Enoxaparin (Lovenox)
Warfarin (Coumadin)
Dabigatran (Pradaxa)

Thrombolytic agents

Activase (tPA)
Retavase (Reteplase)
TNKase (Tenecteplase)

the system. (Turn to page 20 to learn more about these new anticoagulants.)

Thrombolytic agents: Drugs in this class of blood clot medications are known as fibrinolytic or “clot-busting” drugs. Like anticoagulants, they also focus on fibrin. But rather than preventing fibrin formation, they “bust” it up. “These clot-busting drugs actually break down the fibrin strands,” explains Dr. Weitz. “They weaken the nets that hold the platelet clumps together, and the clot falls apart.”

Clot-busting drugs come in separate families of their own—tissue plasminogen activator (tPA), newer derivatives of tPA, such as reteplase and tenecteplase, and streptokinase (SK). Medications such as tPA are often an important treatment for heart attack and stroke and are frequently administered in an acute emergency setting.

Targeting the clots

Which medication your doctor will prescribe depends on what kind of clot you have, says Dr. Weitz. “In general, arterial clots tend to be predominately composed of platelets and very little fibrin, so antiplatelet drugs are a mainstay for arterial thrombosis prevention and treatment,” he says. “Venous clots tend

to be more fibrin rich and have fewer platelets, so anticoagulants tend to be the choice there. But there’s a lot of overlap in treatment.”

Your condition also dictates how long you’ll need the medicine. “If we’re giving aspirin for secondary prevention after a heart attack, the treatment will be for the rest of that person’s life,” says Dr. Weitz. “A blood clot in a leg vein after arthroscopic surgery will mean that the patient will need about three months of blood thinner therapy. Treatment length is quite variable according to the situation.”

A shared side effect

Each medicine for blood clots, whether it’s an antiplatelet, anticoagulant or clot-buster, has its own unique side effects, but there’s one that’s common to all of them: the potential for bleeding.

“In a way, they’re all anti-thrombotic drugs—in other words, drugs that are designed to reduce the risk of thrombosis,” says Dr. Weitz. “Therefore they can all produce bleeding, and that is by far the most common side effect. If you use them in combination, such as two antiplatelet drugs or an antiplatelet drug and an anticoagulant, you increase the bleeding risk.”

To complete your understanding of blood clot medications, discuss your questions and concerns with your doctor. ■



For more information about the research and treatment of venous disease at the University of Michigan, contact 1-888-MVENOUS or <http://surgery.med.umich.edu/vascular/patient/disease-specific/venous> or www.vdf.org/clinical

Treating venous disease

Promising drugs,
biomarkers and
targeted therapy
give hope
to patients

By Wes Isley

With some form of venous disease (diseases of the veins) affecting 60 percent of Americans, researchers and surgeons continue their efforts to improve the safety, effectiveness and variety of treatments. In most cases, venous disease cannot be cured but can be managed with regular physician care.

Still, treatment advances are needed to help improve the quality of life in patients with conditions such as varicose veins, in which superficial veins in the legs bulge and become unsightly, causing pain and swelling. Other research efforts focus on treating more acute and life-threatening conditions such as deep vein thrombosis (DVT), in which clots form in veins hidden deep within the legs.

The good news for patients at risk for or suffering from venous disease is that a number of new treatments may soon make a difference in their lives. "The importance of both acute and chronic venous disease is now on the national radar," says Thomas Wakefield, MD, professor and head of vascular surgery at the University of Michigan in Ann Arbor. "It is a very exciting time." Dr. Wakefield also serves as a representative of the American Venous Forum to VDF's Venous Disease Coalition.

Significant advances

Wakefield notes a number of "significant advances" for varicose vein treatment that have occurred within the past decade, including procedures known as endovenous ablation or, more commonly, laser treatment; and radiofrequency ablation, or RFA. These minimally invasive procedures work by sealing damaged veins and diverting blood flow to nearby healthier veins. Similarly, powered phlebectomies use fiberoptic technology to illuminate damaged veins and, with tumescent anesthesia and minimal incisions, remove them. Procedures like these have shortened recovery time for patients, improved cosmetic results, and reduced pain from varicose veins.

"I think there are more advances to be made," adds Wakefield, "such as improvements in catheter systems, the ability to use even less anesthesia and the use of smaller [phlebectomy] devices that make smaller incisions—all are advances that I see occurring within the next few years."

A promising area of research

Anticoagulant research is one area Wakefield finds particularly promising since it would reduce the risk of bleeding when treating DVT. "Anticoagulants work by limiting the body's ability to clot, but that occurs not only where you want it

to but also where you don't want it to occur, so bleeding is always a risk."

Currently, commonly used anticoagulants like warfarin not only carry the risk for bleeding, but also require careful monitoring and can interact with food or other medications. Wakefield says patients may soon benefit from a new anticoagulant that eliminates these concerns. "There are three agents that are well on the way to development, so a replacement for warfarin is clearly on the horizon," he says. "That will be a big advance for long-term patient care."

The potential of biomarkers

In his own lab, Wakefield is exploring the use of biomarkers to aid in DVT diagnosis. Biomarkers are typically proteins which, when present in the blood, can indicate the presence or absence of a disease. With DVT, clots are currently identified using ultrasound imaging, however, the technology isn't always readily available. "It would be much more convenient if physicians had a biomarker that they could find quickly with a simple blood test to determine whether a patient does or does not have a clot."

It's complicated work that requires extensive review to determine exactly what the biomarker indicates and whether it can be used effectively in a clinical setting. Wakefield says biomarkers also hold the potential to reveal which patients need more aggressive therapy and which patients need less, thereby eliminating unnecessary or costly treatments.

Limiting clot formation

Perhaps the most intriguing research currently under way in Wakefield's lab is aimed at preventing a clot from ever forming in a vein in the first place. "There's a definite connection between clot formation and inflammation," he says. When a vein is weakened or damaged, for example, the body naturally stimulates the clotting process. However, this stimulates an inflammatory response that, in turn, causes more clotting, and you get a vicious cycle that feeds upon itself. "If you can target and block the cycle at some point, you can stop the entire process," says Wakefield. "The goal is to either limit clot formation or treat an existing clot without putting the patient at risk for bleeding."

Until researchers can fine tune these potential treatments and prove their ability to help patients, Wakefield says his best recommendation is to encourage patients to work closely with their doctor on a therapy plan. "Patients must also take active steps and get into a good program of vein health. It is truly a partnership between physicians and patients that best treats venous disease." ■

Warfarin, make way

New anticoagulants offer improved therapy over the former go-to blood thinner

By Jennifer Sellers

The 1940s and '50s were a time of great medical advances in life-saving drugs. And while wonder drugs like antibiotics were making waves, another important drug was hitting the market: warfarin.

Warfarin, which is also known by its brand name Coumadin, is one of the first and most widely used anticoagulants. In fact, not long after it was introduced, it was administered to President Dwight D. Eisenhower for treatment after a heart attack. Several decades later, it's still being used successfully to treat patients with atrial fibrillation, deep vein thrombosis (DVT), pulmonary embolism (PE) and heart attack. However, newer anticoagulants offer similar or more effective—and safer—results.

Understanding anticoagulants, old and new

For all of its successes, warfarin comes with some inconveniences. It is a drug that interacts negatively with many other drugs and with high vitamin K intake in the diet.

“When all we had was warfarin as our oral blood thinning medication, we had to be very careful about which drugs we prescribed it with,” says Jeffrey Weitz, MD, professor of medicine, biochemistry and biomedical sciences at McMaster University in Hamilton, Ontario, and executive director of the Thrombosis and Atherosclerosis Research Institute, which is also in Hamilton. “It interacts with just about every drug you can imagine. And those other drugs can increase or decrease the anticoagulant effects in warfarin. It is a real





problem because it is really hard to keep all of the different drug interactions straight.”

And not only did doctors and patients have to watch other drugs, they had to keep an eye on supplements and dietary intake as well. “With warfarin, the vitamin K intake in your diet will affect the anticoagulant activity of warfarin,” continues Dr. Weitz. “It has to do with how warfarin operates in the body. It works by interfering with the vitamin K cycle in the liver. If you have a lot of that vitamin in your diet, you’ll need more warfarin.”

So, while warfarin served the 20th century well, it’s now the 21st century, and a more advanced breed of blood thinners, which have been in development for the past several years, are starting to hit the market.

“These new oral agents are creating a lot of excitement because, for 60-odd years, all we had was warfarin,” says Dr. Weitz. “Finally, we’re seeing the availability of new options that streamline long-term anticoagulation management.”

Dr. Weitz says that the newer types of anticoagulants don’t use the vitamin K mechanism and thus create fewer interactions and adjustments of dosage. Although, the goal—preventing fibrin formation—is still the same, the method the new anticoagulants employ is specific enzyme targeting. Fibrin is the material in the blood that ties together clumps of platelets to create clots. The primary job of an anticoagulant is to prevent the formation of fibrin. (Turn to page 16 to learn more about the roles of different blood clot medications.)

“There are two key enzymes—thrombin and factor Xa (pronounced “ten a”)—in the clotting mechanism that drive the formation of fibrin strands,” says Dr. Weitz. “The new anticoagulants target one or the other of those enzymes. So with these newer agents, the drug interactions are much more limited; doctors and patients don’t have to worry as much about that factor.”

Meet the new anticoagulants

There are actually a number of these new drugs, but as of right now, only one is approved by the U.S. Food and Drug Administration (FDA). The two you should know about are dabigatran, which is a thrombin inhibitor, and rivaroxaban, which targets factor Xa.

Dabigatran, which has the brand name Pradaxa, is licensed in the United States as an alternative to warfarin for stroke and blood clot prevention in people who have atrial fibrillation. It targets the enzyme thrombin. The other new anticoagulant, rivaroxaban, targets the other fibrin-creating enzyme, factor Xa. Dr. Weitz explains that thrombin is the enzyme that converts the soluble protein fibrinogen into insoluble fibrin, while factor Xa is the enzyme that generates thrombin. Rivaroxaban, which has the brand name Xarelto, is under consideration by the FDA for both prevention of DVT after hip or knee replacement surgery and for stroke prevention in patients with atrial fibrillation.

“These are both oral drugs that will likely replace warfarin for long-term anticoagulation for the prevention or treatment of clotting,” says Dr. Weitz. “However, there are more to come. We’ve only seen the tip of the iceberg where these new drugs are concerned.” ■

These FAQs were adapted from a recent article published in a previous version of Keeping in Circulation by Dr. Carmel Celestin of the Cleveland Clinic.

frequently asked questions

Q. Will walking, exercising or physical therapy cause my clots to break loose?

A. Provided that you are taking blood thinner therapy for DVT, getting up and moving around does not increase your risk of PE compared with bed rest. Studies have suggested that those patients with DVT who get out of bed and walked earlier have shown faster resolution of pain and swelling in the legs.

Q. Why do I still have some leg pain and swelling even after the clot is treated or gone?

A. Many patients will develop symptoms of post thrombotic syndrome (PTS) after developing a DVT. The post thrombotic syndrome is a cluster of leg symptoms such as swelling, pain, and discoloration of the legs that can develop after a DVT, especially if the DVT is extensive. The symptoms of PTS are generally controlled with compression stockings. Research has also shown that among patients with leg DVT, the likelihood of developing symptoms of PTS can be reduced by wearing compression hose for two years after a DVT.

Q. Can aspirin help my clots or prevent clots from happening?

A. Aspirin is most effective in reducing vascular events in patient with arterial disease. It does offer some protection against venous disease, but it is not recommended because there are more effective methods of prevention such as heparin, low-molecular-weight heparin, fondaparinux or warfarin are available.

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