



# A PATIENT'S GUIDE TO ANTITHROMBOTIC AND THROMBOLYTIC THERAPY

## Abbreviated Guide

### What Is Antithrombotic and Thrombolytic Therapy?

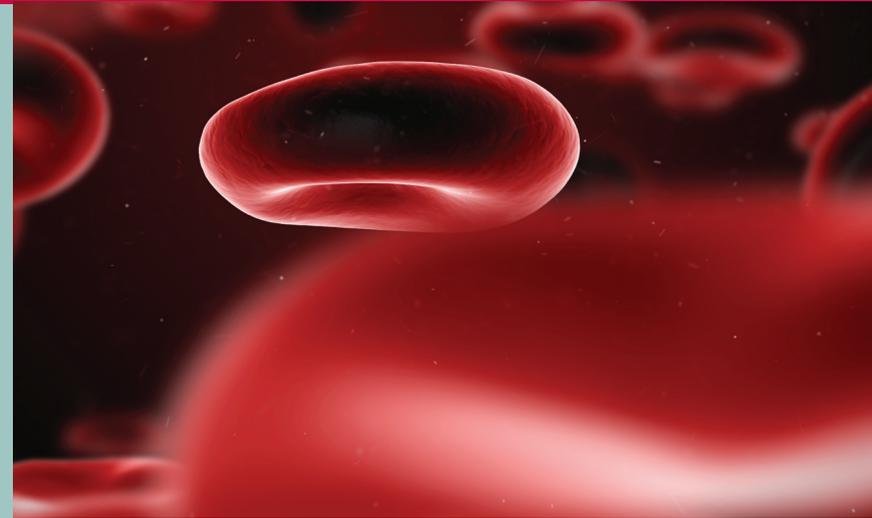
Blood clots that form in leg veins can sometimes break off and travel through the bloodstream into the lungs. The medical term for a blood clot is a thrombus, and the medical term for a blood clot that breaks off and travels into the lung is a pulmonary embolism. About 1 in 20 people will have vein clots or lung clots in their lifetime. Half of them have other illnesses, such as cancer, or get the clot while recovering from surgery or a serious accident, whereas the other half gets the clot “out of the blue.”

Most leg clots are not dangerous, but some clots can be serious and even cause death. Fortunately, using relatively simple measures in people who are at risk (*eg*, those requiring surgery) or by recognizing less serious, earlier signs of leg clots or lung clots and promptly treating them usually can prevent these serious events.

Treatment can be considered in two parts:

(1) immediate treatment of venous clots and lung emboli and (2) long-term treatment. The objectives of immediate treatment of venous clots are to prevent early recurrence of venous clots and lung embolism, to prevent death from lung embolism, and to relieve symptoms. The objectives of continuing treatment are to prevent recurrent venous clots and lung embolism and to relieve symptoms from postthrombotic syndrome.

The following questions and answers will provide you with specific information on how to prevent and treat blood clots.



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### **How does blood circulate through the body?**

- The heart pumps blood through blood vessels in the body.
- Blood is pumped into large arteries in the lungs.
- Blood is pumped into the aorta, which branches into smaller arteries that transport oxygen and nutrients to the tissues and organs of the body.
- The arteries taper down to capillaries. The capillaries join to form a network of veins that transport the blood back to the right side of the heart.
- The oxygen-containing blood then re-enters the left side of the heart through the pulmonary veins for another cycle through the body.

### **What is a blood clot?**

- A solid mass of material that forms inside a blood vessel.
- It can interfere with normal blood flow.
- Also called a “thrombus” or “thrombosis.”

### **What is a helpful blood clot?**

- If a blood vessel is cut, blood flows out of the vessel where it comes into contact with powerful substances that stimulate blood clotting, and the leak is sealed.
- The plug forms a scab, during which time the blood vessel is repaired.

### **What is a harmful blood clot?**

- Blood clotting is harmful when it occurs inside blood vessels.
- It can block veins or arteries.
- It can break off and travel downstream (an “embolism”).

### **What are the major risk factors for a clot in a vein (“venous thrombosis”)?**

- Major surgery
- Major trauma to legs and pelvis
- Prolonged bed rest and immobility
- Cancer
- Advanced age
- Hereditary predisposition
- Previous venous thrombosis

### **What are other risk factors for venous thrombosis?**

- Estrogens
- Pregnancy
- Heart failure
- Chronic illness
- Varicose veins
- Obesity

### **What about airplane travel?**

- Airplane travel is a very minor risk factor for venous thrombosis.
- The risk of developing venous thrombosis is confined almost exclusively to travelers who have other risk factors and to flights that are 6 hours or longer.
- Two risk factors are thought to contribute to the risk:
  - The pooling of blood in the leg veins because of prolonged sitting
  - Dehydration due to the dryness of the cabin air

### **How can venous clots be prevented during air travel?**

- Everyone should exercise the legs and maintain good hydration.
- High-risk patients should wear elastic stockings.

- For patients at very high risk, a subcutaneous injection of low-molecular-weight heparin a few hours before flight time is recommended.

### **What are the common symptoms of venous clots?**

- Pain and swelling in the leg may occur.
- If the clot breaks off and travels to the lungs, chest pain or shortness of breath may occur.

### **What are the common symptoms of deep vein clots (“deep vein thrombosis”)?**

- Pain, tenderness, and/or swelling of the calf or thigh
- Red or blue discoloration of the calf or thigh
- Symptoms of pulmonary embolism (lung clot) (see below for the common symptoms of lung embolism)
- Long-term swelling and leg discomfort

### **What is a lung embolism?**

- A venous clot that breaks off and follows the path of the blood into a lung artery. If the embolus is large, it can block blood flow into lung arteries.
- This can cause severe breathing difficulties and can even be fatal.
- With time, emboli usually break up and disappear.

### **What are the most common symptoms of lung embolism?**

- Difficulty breathing
- Sharp chest pain
- Blood in sputum
- For very large emboli, light-headedness, fainting, and unconsciousness

### **What tests are commonly used to diagnose lung embolism?**

- $\dot{V}/\dot{Q}$  lung scan.
- CT scan of the lungs.
- D-dimer blood test.
- Compression ultrasound of the legs.

### **What are the long-term complications of venous clots?**

- Most patients do not develop long-term complications and recover completely if they receive proper treatment. However, some can develop the following complications in the future:
  - Persistent pain and swelling in the leg
  - Further episodes of clotting in veins or lung arteries

### **Can clots form in any part of the body?**

- Yes, but they usually occur in leg veins.
- Less commonly, they can form in arm veins, cerebral veins, veins draining the intestines, and other veins.

### **What measures can be used to prevent venous clots?**

- Blood thinners (anticoagulants) to slow down clotting
- Physical methods (*eg*, mechanical compression of the calf or wearing elastic stockings) to reduce pooling of blood in the legs

### **When should preventive measures be used?**

- In high-risk patients
- Can be used in low-risk situations, but the balance between benefit and risk becomes less clear

### **In which situations should preventive measures be used?**

- Major surgery
- Major trauma to the chest, legs, and pelvis
- Prolonged immobility
- Major illness requiring hospitalization

### **What are the different kinds of blood thinners?**

- Heparin
- Low-molecular-weight heparin
- Fondaparinux (Arixtra)
- Warfarin (Coumadin)

### **What are the main features of these blood thinners?**

- Heparin and warfarin (Coumadin) have been used for more than 50 years.
- Heparin is given by injection; therefore, it is confined mostly to patients in the hospital.
- Warfarin is taken orally; therefore, it is used most commonly when treatment is given outside the hospital.
- Low-molecular-weight heparins are derived from heparin and were introduced more than 10 years ago. They are given by injection and have fewer side effects than heparin.
- Fondaparinux (Arixtra) is the newest addition to anticoagulant therapy and is given by injection. It is a synthetic compound.

### **If necessary, how can I decide which of these blood thinners to take?**

- They are all effective, and your doctor should decide which one you should use.

### **What are the complications (side effects) of blood thinners?**

- The only common side effect is bleeding.
- Heparin-induced thrombocytopenia and osteoporosis are uncommon.

### **How can venous clots be diagnosed?**

- By compression ultrasonography
- By venogram
- By a D-dimer test, which is useful for excluding a diagnosis of venous clots

### **How are vein clots and lung emboli treated?**

- Immediate treatment: to prevent growth of vein clots, prevent lung emboli, and relieve symptoms
  - Usually treated with an anticoagulant or fibrinolytic agent
- Continuing treatment: to prevent recurrent venous clots and lung emboli and relieve symptoms from the postthrombotic syndrome
  - Usually treated with an oral blood thinner (typically warfarin [Coumadin])

*For additional information:*

Hirsh J, Agnelli G, Albers GW, et al. Antithrombotic and thrombolytic therapy: American College of Chest Physicians evidence-based clinical practice guidelines, 8th edition. *Chest* 2008; 133(suppl):715-9685

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## GLOSSARY OF TERMS

**Anticoagulants:** blood thinners that slow down the clotting of blood

**Fondaparinux (Aristra):** a new synthetic injectable blood thinner that contains the active component of heparin and low-molecular-weight heparin

**Aorta:** a large artery into which blood is pumped from the left side of the heart

**Artery:** a blood vessel that transports blood away from the heart

**Blood vessel:** a tube that transports blood throughout the body

**Color Doppler:** a diagnostic test for venous thrombosis

**Compression ultrasound:** a diagnostic test for leg vein clots

**Coumadin:** the trade name for warfarin

**D-dimer:** a blood test to diagnose venous thrombosis and pulmonary embolism

**Deep vein thrombosis:** a blood clot in a deep vein of the leg

**Duplex ultrasound:** same as compression ultrasound of the veins

**Embolism:** a blood clot that breaks off and is carried by the flow of blood

**Fibrin:** a thread-like substance that is derived from blood and makes up part of a clot

**Fibrinolytic drug:** a “clot buster” that dissolves blood clots

**Heparin:** an injectable blood thinner

**Low-molecular-weight heparin:** an injectable blood thinner prepared by cutting heparin into smaller parts

**Lung scan:** a diagnostic test for pulmonary embolism

**Phlebitis:** inflammation of a vein

**Platelets:** small sticky particles that make up part of a blood clot

**Postthrombotic syndrome:** chronic leg swelling and discomfort that can occur as a complication of venous thrombosis

**Prophylaxis:** prevention

**Pulmonary artery:** the blood vessel into which blood is pumped from the right ventricles that transports blood to the lungs

**Pulmonary embolism:** a blood clot in a vein that has broken off and traveled to the blood vessels of the lung

**Pulmonary hypertension:** increased blood pressure in the pulmonary arteries

**Superficial vein thrombosis:** a blood clot in a vein close to the skin

**Thrombosis:** blood clot

**Vein:** a blood vessel that transports blood back to the heart

**Venogram:** an x-ray test to diagnose venous thrombosis

**Warfarin (Coumadin):** an oral blood thinner of the class of drugs known as coumarins

## ADDITIONAL INFORMATION

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[www.chestjournal.org/content/133/6\\_suppl](http://www.chestjournal.org/content/133/6_suppl)

[www.chestnet.org](http://www.chestnet.org)

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[www.accp.com/](http://www.accp.com/)

American Society of Health-System Pharmacists

[www.ashp.org/](http://www.ashp.org/)

### Other links:

Surgeon General's Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism, 2008

[www.surgeongeneral.gov/topics/deepvein/](http://www.surgeongeneral.gov/topics/deepvein/)

AHRQ: Your Guide to Coumadin®/Warfarin Therapy

[www.ahrq.gov/consumer/coumadin.htm](http://www.ahrq.gov/consumer/coumadin.htm)

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