PSST!

Plan to Stay in Shape Today

EVERYTHING YOU NEED TO KNOW ABOUT BLOOD AND ANTICOAGULANTS

familiprix

We all know that blood plays a vital role in keeping us alive. Look at how fast we can heal from a cut—what an amazing ability! But blood also plays an important role outside our bodies. By making the selfless decision to donate our blood, we can save lives. This substance running through our arteries and veins is fascinatingly complex and merits closer attention. This guide provides an overview of blood's key components to help us better understand just how valuable it is. The last section covers the blood thinning medications that some people need to survive.

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ALL
ABOUT
BLOOD

Blood is a red, opaque, rather viscous liquid that tastes slightly metallic and salty. Some people's blood is darker in colour depending on how much oxygen it contains. Blood is heavier than water and accounts for about 8% of our body mass. Depending on our weight, age, and size, our bodies contain four to six litres of blood—the equivalent of **five pints of milk**!

Basic blood functions

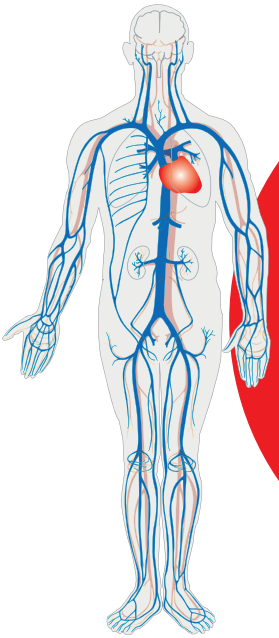
Blood—that distinctive vital fluid coursing through your veins—acts as your body's primary transport system.

Its role is to make sure your entire body gets what it needs to survive, including oxygen, nutrients, and hormones. Blood also carries away waste.

In addition, blood helps regulate body temperature, the pH of tissues, and the appropriate volume of liquid essential to your system. It aids in your body's defense and has a role in coagulation, or your body's ability to stop bleeding.

Blood circulation

Your heart pumps oxygen-rich blood through your **arteries** to your entire body. Blood transports oxygen and nutrients to various bodily tissues as it travels through the blood vessels. It is then carried by the **veins** to the lungs where it is reoxygenated, finally returning to the heart to start the journey all over again.



DID YOU KNOW THAT...

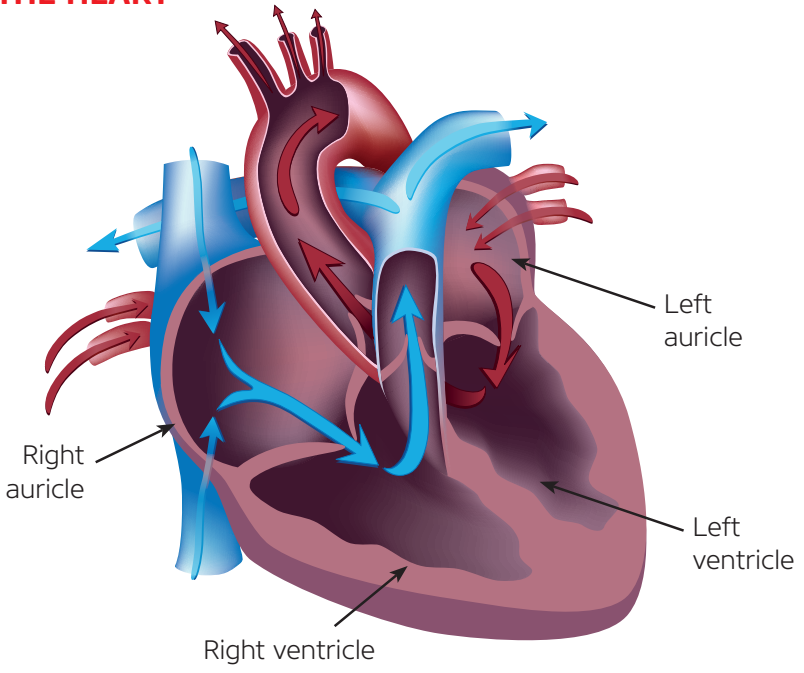
Our blood circulates constantly through a total of

100,000 KM

of blood vessels. That's the equivalent of going around the world twice and finishing up with a roundtrip between Quebec and Japan!

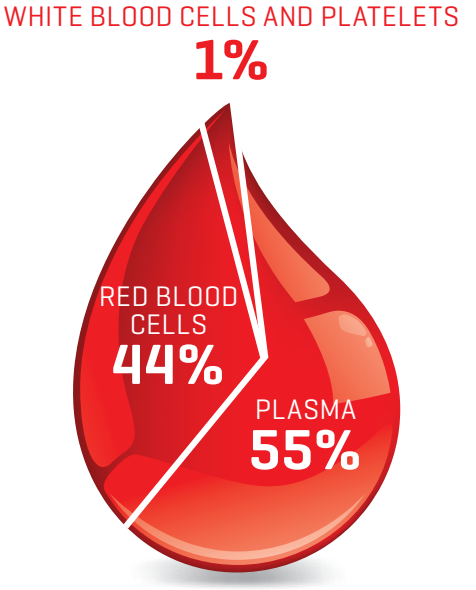
- Oxygen-rich blood leaves the heart and is circulated by the arteries. It is usually represented as red in colour because it is full of energy.
- Oxygen-depleted blood is carried back to the heart by the veins. It is often depicted as blue because it carries back waste.

ANATOMY OF THE HEART



Blood composition

Blood is not just a liquid. It also consists of solid (or formed) elements visible only under a microscope that give it its thick, viscous consistency. Specifically, blood is composed of:



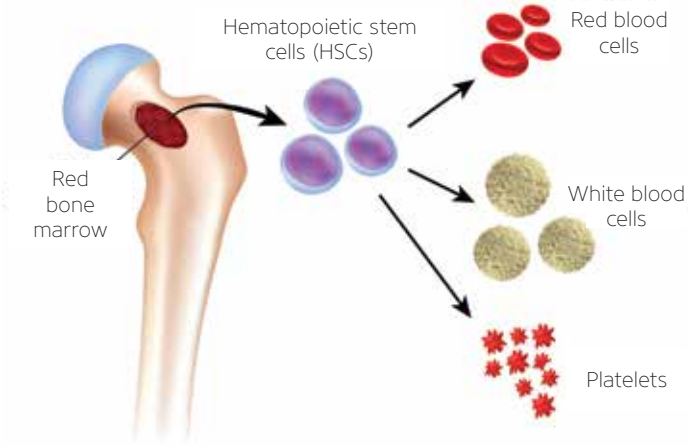
PLASMA

Plasma is the liquid that carries blood cells, platelets, and other components. Surprisingly enough, water accounts for 90% of the total volume of plasma. The other 10% is made up of various proteins, salts, lipids, nutrients, gases, hormones, vitamins,

and waste. Plasma helps maintain your blood's pH balance, transport solutes through the body, and distribute body heat evenly. The main protein found in plasma is **albumin**, which acts as a shuttle in transporting certain molecules, like drugs, through the circulatory system.

THE ORIGIN OF OUR CELLS

Despite their very different roles, red blood cells, white blood cells, and platelets all originate from the same place: **stem cells**. Stem cells also give rise to all the other cells in our body, including muscle and bone cells. Stem cell production occurs in the **bone marrow**—a tissue found inside certain bones. Stem cells are also found in the umbilical cord at birth.



RED BLOOD CELLS: OXYGEN CARRIERS

Red blood cells look like little red donuts, but their tiny size belies the huge role they play. Red blood cells account for 44% of the volume of blood in your body. Their nickname of "oxygen carriers" speaks to their importance, since they transport 98% of the oxygen from our lungs to our body's cells and tissues. Red blood cells also return carbon dioxide back to the lungs and transport other waste to the kidneys for elimination.

Red blood cells typically live for about 120 days. Your body has to produce two to three million new red blood cells every second to ensure you never run out! Their red colour comes from **hemoglobin**, the molecule officially responsible for oxygen transport. Specifically, it's the **iron** contained in hemoglobin that produces that notorious red colour when it reacts with oxygen.

THE IRON found in hemoglobin primarily comes from what you eat. Your body can't create iron on its own, which is why an iron-rich diet is so important. The best food source for iron is liver, but that can be an acquired taste! Other good sources of iron include seafood, fish, oysters, red meat, poultry, nuts, green vegetables, legumes, and whole wheat. Vegetarians are at a higher risk of developing an iron deficiency because of their meat-free lifestyle, but also because it's more difficult for the body to absorb iron from plant-based sources.

If your body does not store enough iron, you may end up with a condition called iron deficiency anemia. Signs of anemia include weakness, pale skin, a lack of energy, and fatigue. An iron deficiency may be caused by a variety of factors, including a lack of iron-rich foods in your diet or particularly heavy blood loss during menstruation. If you have **iron deficiency** anemia, your healthcare professional may recommend an iron supplement and medical monitoring to build up the iron reserves your body needs.

WHITE BLOOD CELLS: TINY SOLDIERS

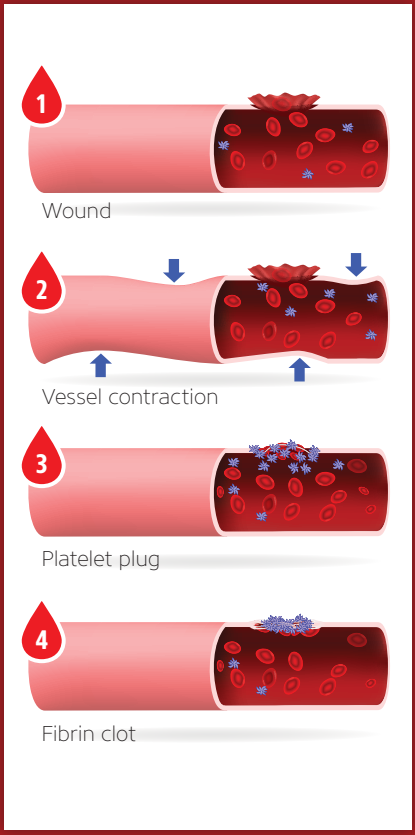
White blood cells, which account for less than 1% of your body's total volume of blood, have an entirely different, though no less critical, role than red blood cells. They act as little soldiers in fighting off the body's enemies—namely bacterias, parasites, and viruses—that attack the immune system. White blood cells actually produce antibodies. They can repair damaged tissue and mobilize to heal a wound or fight off an infection. Some white blood cells are also responsible for allergic reactions. They're called "white" blood cells because when they're separated from other types of blood cells, they form an off-white paste.

PLATELETS: BAND-AIDS OF THE BLOODSTREAM

Platelets are key to a fascinating phenomenon: When you injure yourself, how does the bleeding stop? Basically, platelets band together to stop the bleeding by forming a scab. Platelets help limit blood loss, promote scarring, and have an important role in blood coagulation.

WHAT HAPPENS WHEN I CUT MYSELF?

1. Almost as soon as you cut yourself, blood begins to flow to the injury site.
2. The body quickly reacts to prevent hemorrhaging and slow blood loss by contracting the impacted blood vessels.
3. The platelets come together at the site to stop the blood flow—this is known as **platelet plug** formation.
4. Finally, various coagulation factors present in plasma work to form a **fibrin clot**—commonly called a scab—to stop the blood loss. Once your skin has regenerated at the injury site, the scab falls off.



WHY DO I GET A BRUISE WHEN I BANG INTO SOMETHING?

An ecchymosis, commonly known as a bruise, forms under the skin following an effusion of blood caused by a blow to the skin. A bruise happens when blood vessels below the surface of the skin rupture. Some people bruise more easily than others because their vessels are weaker. The blue colour is actually just an illusion created by the skin, which acts as a filter and only allows blue light to pass. Underneath it all, your blood's just as red as ever!

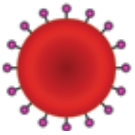
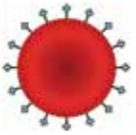
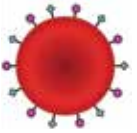
Bruises usually change colour as hemoglobin breaks down into various products. The colours may overlap since more than one product can be present at a time. So a single bruise may contain a myriad of colours, from purplish-blue to nearly black to yellow, not to mention brown and green.

Blood types

Two different classification systems are used to determine blood type, which refers to the presence or absence of substances called **antigens** on the surface of red blood cells.

First there's the **ABO system**, which corresponds to four blood types: A, B, AB, and O. Let's say you are in the A group. This means that you only have A antigens on the surface of your blood cells. If you carry antigen B you are in the B group, and if you carry A and B you are in the AB group. If your blood cells have no antigens on their surface, you are part of the O group—the most common blood type in North America.

ABO BLOOD GROUP
System

Group	A	B	AB	O
Red Blood Cell Type				
Antigens Present	 Antigen A	 Antigen B	 Antigen A & B	None

Distribution of BLOOD TYPES IN QUEBEC		Rh+ 85%	Rh- 15%
O	46%	39%	7%
A	42%	36%	6%
B	9%	7.5%	1.5%
AB	3%	2.5%	0.5%

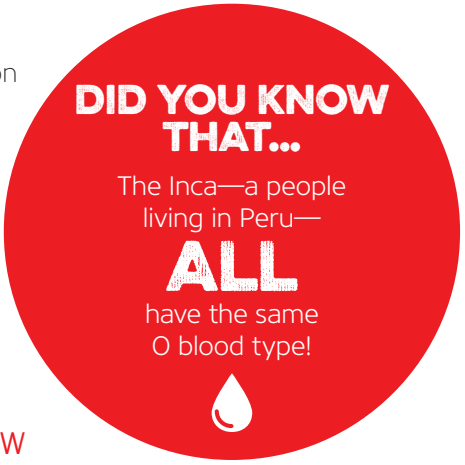
Source: hema-quebec.qc.ca

Then there is the **Rh system**, which is divided into two groups: positive and negative. Like the ABO system, categorization depends on the absence or presence of the rhesus (Rh) factor on the surface of red blood cells. The presence of the Rh factor indicates a positive blood type and the absence indicates a negative blood type.

DID YOU KNOW THAT...

The Rh factor got its name from the ***rhesus monkey*** where it was first discovered—even before it was observed in human blood!

In Quebec, 39% of the population has an O+ blood type—the most common one—followed by A+ at 36%. By comparison, AB- is the least common blood type, accounting for only 0.5% of the population. The distribution of blood types varies widely among the world's populations.



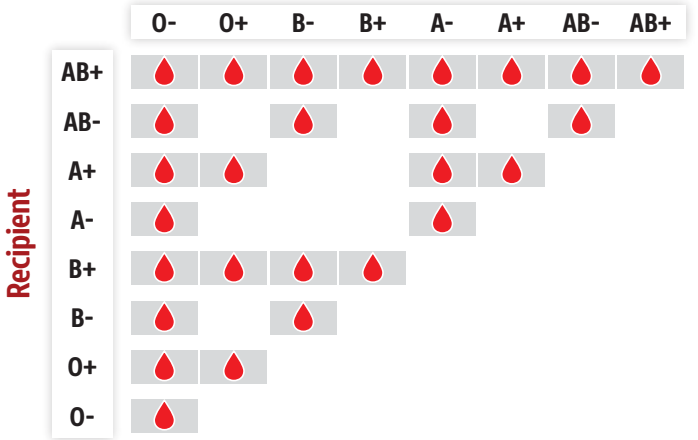
WHY IS IT IMPORTANT TO KNOW YOUR BLOOD TYPE?

If you're ever in a situation where a blood transfusion becomes critical for your survival—for instance, if you're in an accident or have to undergo surgery—the doctors must know your blood type because of compatibility issues between donors and receivers. Combining two incompatible blood types could have disastrous consequences. If the recipient's body doesn't recognize the foreign antigens, their immune system could reject the donor's blood.

People with O- blood and no antigen on the surface of their blood cells are considered **universal donors** because they can't contaminate someone else's blood. Conversely, if O- patients are given A, B, or positive blood, their bodies will reject it because they wouldn't recognize the antigens. People in the AB+ group who have the A and B antigens and the positive factor on the surface of their red blood cells can receive blood from anyone because their bodies will recognize any type. These people are called **universal recipients**.

If someone requires an emergency blood transfusion and there's no time to find out the person's blood type, O- will be used.

Compatibility of BLOOD TYPES



Source: hema-quebec.qc.ca

What about donating blood?

Many people are wary of donating blood, but it might relieve their fears if they knew exactly what happens to the blood they so generously donate. People may not realize that the entire blood donation process takes about an hour, but only ten minutes of that is the actual collection time.

The quantity drawn is approximately 12% of our blood volume, and it only takes our body 56 days to regenerate all the components removed. When a hospital patient needs blood, doctors don't administer the contents of a donor's blood bag directly to the patient. Instead the blood is separated into its component parts, so it can be used to meet patients' specific needs. So when you donate blood, your:

DID YOU KNOW THAT...

Someone in Quebec needs blood every **80 seconds**!

Yet only **3%** of the Quebec population who are eligible to donate do so.

- **Red blood cells** could be given to accident victims or surgery patients and people suffering from anemia (a shortage of red blood cells).
- **Platelets** could be given to patients undergoing chemotherapy treatments.
- **Plasma** could go to severe burn victims and to promote clotting.

What are blood tests for?

A few milliliters of blood might not seem like much, but in many ways it's actually a strong indicator of our overall health. A blood sample may be used to establish a medical diagnosis or verify that a certain treatment is taking effect. Blood tests can be used to measure:

- Blood sugar level (diabetes)
- Cholesterol level
- Your kidneys' ability to eliminate waste
- The concentration of certain medications in your blood
- How efficiently your thyroid gland is working
- The complete contents of your blood (blood cells, platelets, etc.)
- Your immune system's ability to do its job
- And much, much more

If a healthcare professional recommends certain blood tests, it's important not to put them off. The quicker your doctor or pharmacist has your most recent blood results, the faster they can take the necessary steps to keep you healthy. Ask a healthcare professional for any test-specific instructions since every test is different.

Blood disorder overview

Like the rest of the body, your blood can also be affected by various conditions. Blood disorders can strike the red blood cells, white blood cells, and platelets, among other components. Here is an overview of the most common ones.

Anemia is characterized by a reduced ability of the red blood cells to transport oxygen through our body. It may be the result of a number of factors, including serious blood loss that cuts the number of red blood cells available to carry out their function, a decrease in the amount of hemoglobin, or a genetic anomaly affecting the formation of hemoglobin. Some people's red blood cells are genetically weaker or have an innate shortage of certain components, such as iron or vitamin B12. The various types of anemia can usually be controlled through medication. The most common form is iron deficiency anemia, which is covered on page 11.

Leukemia can be defined as a cancer of the blood. There are different types of leukemia depending on the type of abnormal cells produced. Acute forms of leukemia are more common in children, while chronic forms tend to occur more often in the elderly. If left untreated, all forms of leukemia eventually result in death.

Mononucleosis is a highly contagious **virus** most commonly found in children and young adults. It's sometimes called the kissing disease. It rarely goes undetected because people who catch mononucleosis have clear symptoms, including exhaustion, chronic sore throat, aches and pains, and a low grade fever. Mononucleosis usually goes away on its own after a few weeks, and rest is the only recommended treatment.


BLOOD
THINNERS
(ANTICOAGULANTS)

Some people are at a higher risk of developing blood clots, either due to their genetics or because they suffer from a certain medical condition. These people have to take medications to thin their blood and slow clotting. These drugs are called anticoagulants or blood thinners, the most common of which is warfarin (Coumadin®).

Thrombosis is the formation of a blood clot in a blood vessel (artery or vein) or in the heart. An **embolism** is when a clot breaks loose or detaches from the site where it was originally formed, is carried by the circulatory system, and ends up lodging in a blood vessel farther away, usually in the lungs. Anticoagulation therapy is required in certain cases, including:

- Stroke
- Deep vein thrombosis (DVT or phlebitis)
- Pulmonary embolism
- Atrial fibrillation

How can you tell if anticoagulation therapy is working?

The effectiveness of anticoagulation therapy can be evaluated using a laboratory test performed on a blood sample. This test gives us an international normalized ratio (**INR**) value. The **INR** tells us the prothrombin time, or how long it takes your blood to clot. In patients undergoing anticoagulation therapy, the INR increases with the desired anticoagulation effect: the thinner the blood, the higher the INR.

WHAT SHOULD MY INR BE AND WHY?

People who are not on anticoagulants should have an INR of around one. Depending on a patient's illness and specific health conditions, a healthcare professional may prescribe blood thinners so the patient's blood does not clot as quickly. In these cases the INR target zone may vary:

From 2 to 3 **OR** 2.5 to 3.5.

Below the target value the blood is considered too thick and may clot too easily. Conversely, above the target range the blood may be too thin or too liquid and could cause heavy bleeding. A high INR is just as dangerous as a low one. It's important to know your personal target zone when you are undergoing this kind of treatment.

WHAT CAUSES INR VARIATIONS?

The appropriate anticoagulant dose should be determined at the start of treatment. In fact, the same dosage will slow clotting at different levels from patient to patient. Test results vary, so the recommended anticoagulant doses will also vary at the beginning, but tend to stabilize after a few weeks of therapy. But the INR can be affected by other factors even once it's stabilized. That's why it's important to test your blood **at least once a month**—or more often if your healthcare professional recommends it.

Blood tests can usually be done in a local community service center (CLSC) or hospital, but there are also portable home INR monitors on the market that are reliable and safe. It's important to talk to your pharmacist to find out if these devices are an option in your situation.

Many pharmacies offer onsite INR testing services. Some also offer dosage adjustments. Talk to your pharmacist to find out what's involved.

OTHER FACTORS BESIDES YOUR ANTICOAGULANTS MAY AFFECT YOUR INR, INCLUDING:

1. Certain prescription or over-the-counter drugs

2. Certain natural health products

3. Your diet

4. Alcohol consumption

Other conditions such as diarrhea, fever, periods of intense stress, and travel may also impact the effectiveness of anticoagulation therapy.

1. SOME DRUGS THAT AREN'T ANTICOAGULANTS AFFECT INR

Blood thinners are known to interact with many other medications. **It's important never to start or stop a medication, whether prescribed or over-the-counter, on your own without first consulting a healthcare professional**. This applies across the board, even in the most mundane situations (e.g., when you want to take something for general aches and pains).

Anti-inflammatories and medicines containing aspirin have a natural tendency to thin the blood and may be hard on the stomach. Used alongside anticoagulants, they may cause gastrointestinal bleeding.

The best approach is to avoid taking medicines prescribed by a doctor or recommended by a pharmacist if these healthcare professionals are not aware that you are on anticoagulants.

2. NATURAL HEALTH PRODUCTS CAN CAUSE INR TO FLUCTUATE

Certain popular and seemingly safe natural health products like glucosamine, St. John's Wort, chamomile, and garlic, to name a few, interact with anticoagulants and may significantly impact how quickly your blood clots.

3. DOES DIET AFFECT INR?

A proper diet impacts virtually every aspect of your health. We all know **green vegetables** are healthy, but patients taking anticoagulants actually have to limit their consumption. This is because green vegetables are rich in **vitamin K**, which is an antidote to anticoagulants. Vitamin K actually counteracts the effect of warfarin, effectively thickening the blood. So it's important to eat regularly but consume foods containing vitamin K in moderation (especially green leafy vegetables).

If your vitamin K intake varies significantly from week to week, your INR may fluctuate as well. On the flipside, if you maintain a consistent intake, your INR will also remain stable. Foods rich in vitamin K include:

- Broccoli
- Brussels sprouts
- Cranberry juice
- Lettuce and leafy greens
- Watercress
- Spinach
- Green tea
- Etc.

4. ALCOHOL

Acute alcohol intake—for instance, at a party where the beer and wine are flowing freely— increases the anticoagulant effect (thinning the blood) while regular, chronic alcohol consumption tends to decrease it (thickening the blood). Obviously daily alcohol consumption is not recommended, and it's important to remember that no matter what your situation is, women should limit themselves to two drinks a day and no more than 10 a week. For men, the guideline is three drinks a day and no more than 15 a week. One drink is the equivalent of:

150 ML
(5 OUNCES)
WINE

or

350 ML
(12 OUNCES)
BEER

or

45 ML
(1.5 OUNCES)
LIQUOR

What are the risks of anticoagulation therapy?

Taking an anticoagulant exposes you to two major risks:

- **Thrombosis** (clot) if the dosage is too low
- **Bleeding** if the dosage is too high and the blood becomes too thin

TWO TYPES OF BLEEDING CAUSED BY ANTICOAGULANTS

1. **Bleeding generally considered MINOR:**

- Occasional nosebleeds
- Bleeding after shaving
- Bleeding gums – if it only happens every once in a while
- Heavier than normal menstrual bleeding – if it only happens every once in a while
- Ecchymosis (bruising) that is repeated and spontaneous (not the result of a blow)
- Subconjunctival eye hemorrhage (red eye)

2. Potentially SERIOUS bleeding:

- Blood in the urine – even if it only happens every once in a while
- Black stool (like tar) – even if it only happens every once in a while
- Vomiting or spitting up blood

Pay particular attention to potential signs of internal bleeding not visible from the outside. This type of bleeding is considered an emergency requiring immediate medical attention. Signs and symptoms may include:

- Unusual fatigue
- Abnormal shortness of breath
- Racing pulse
- Nausea and vomiting
- Shivering and cold sweats
- Unusually pale skin
- Headache that doesn't respond to usual treatment
- Unexplained general discomfort

If you are experiencing symptoms of even minor bleeding, it's important to:

- Inform medical personnel and paramedics that you are taking anticoagulants.
- Avoid rough activities and violent sports that could cause traumatic injury resulting in bleeding.
- Avoid intramuscular injections because they could cause a hematoma to form.
- Handle sharp objects with care. If you get cut, compress the wound for 5 to 10 minutes. Consult a healthcare professional if the bleeding doesn't stop.

If one or more of these symptoms happen to you, inform your healthcare professional during your next visit. If the bleeding is significant, go to the hospital right away.

Frequently asked questions

WHO NEEDS TO KNOW THAT I'M TAKING AN ANTICOAGULANT?

To avoid the risk of bleeding, you should inform all healthcare professionals (e.g., doctors, dentists, pharmacists, nurses, etc.) that you are taking an anticoagulant. This information can greatly impact the decisions they make or advice they give regarding surgery, a dental extraction, analysis of your drug or medical record, etc. Ideally, you should always carry an ID card and/or wear a MedicAlert® bracelet indicating you take blood thinners.

CAN I STILL PRACTICE SPORTS OR ENGAGE IN PHYSICAL ACTIVITIES?

Participating in most sports is fine and may even be beneficial because they promote good blood circulation. However talk to your healthcare professional before starting a new sport or physical activity with a significant risk of falling, injury, or physical contact.

WHAT IF I'M PREGNANT?

Pregnant patients are advised against taking warfarin (Coumadin®) because it may have toxic or even fatal effects on the fetus. Inform your doctor if you are pregnant or planning to become pregnant.

WHAT CAN I DO TO EASE MY PAIN?

The only pain medication recommended for use with anticoagulants is acetaminophen. It's important to adapt the recommended dose, because even though acetaminophen is considered safe it may cause your INR values to fluctuate. Be sure to talk to your healthcare professional to check the recommended doses.

WHAT IF I'M GOING ON VACATION?

First, packing your anticoagulant medication in your checked bags is not recommended. Checked bags are transported in the baggage hold and can be lost or delayed. For international trips, make sure you pack enough medication for the duration of your trip plus a few extra days in case your return is delayed. If you're traveling to a hot and humid destination, store the pills in a cool, dry container. And we recommend sticking to your routine (diet, alcohol, etc.) even when you're on vacation. Since certain anticoagulants require close monitoring, don't forget to tell your healthcare professional about your travel plans.

Conclusion

Whether our blood is thin, thick, A+, or O-, it's essential to our survival and donating it saves lives. Contact agencies in your region for their blood drive schedule. And keep in mind that healthy habits keep our blood healthy. Taking care of yourself should be in your blood!

References

Canadian Hemophilia Society
www.hemophilia.ca

World Federation of Hemophilia
www.wfh.org

Héma Québec
www.hema-quebec.qc.ca

Canadian Blood Services
www.blood.ca

Canadian Cancer Society
www.cancer.ca

RxVigilance

Marieb, Elaine N. (1999) ***Anatomie et physiologie humaines.*** 2nd edition. Édition du renouveau pédagogique inc. Saint-Laurent. 1,194 pages.

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IN THIS GUIDE

Only pharmacists are responsible for the professional activities of pharmacy practice. They use various tools such as the PSST! (Plan to Stay in Shape Today) program.

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