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The safe use of anti-clotting medication



When we hurt ourselves and it starts to bleed, our bodies make sure that the bleeding soon stops and a clump of blood (a blood clot) forms to close the wound. This reaction is very important, because it ensures that we lose as little blood as possible, stops germs from getting into the wound, and allows the wound to heal.

But sometimes blood clots form in the bloodstream even though there are no external injuries, and blood vessels may become blocked as a result. This can lead to dangerous complications such as a heart attack or stroke. It is very uncommon for blood clots to develop in the blood vessels of healthy people. But certain illnesses and genetic factors can increase the risk of this happening. Many people who have this higher risk take anti-clotting medication to try to prevent blood clots from developing.

Anti-clotting medication is effective, but can also have adverse effects and interact with other medications. If you are taking anti-clotting medication on a long-term basis, it is important that you understand how it works and what to look out for if you want to avoid adverse effects. For example, if you know you are going to have a surgical procedure, it is important to talk to your doctor about whether and, if so, when you should stop taking your anti-clotting medication to prevent bleeding complications.

Understanding your illness and knowing about the signs of complications can make it safer for you to use anti-clotting medication. This fact sheet describes how this medication works, the differences between various types of anti-clotting medications, and what to look out for when taking them.

How does blood clot?

In order to understand how anti-clotting medication works, it might help to understand how blood coagulates (clots). When we hurt ourselves and it starts to bleed, this is what happens:

Our blood vessels become narrower. This reduces the flow of blood to the injured tissue, limiting the loss of blood. Blood platelets in the bloodstream, so-called thrombocytes, attach to the damaged area of the blood vessel and clump together to reduce the bleeding. Certain substances in the blood and tissue are then activated and a particular protein is formed. This protein solidifies the blood clot and makes it stick to the damaged area. These substances are called clotting factors or coagulation factors. There are 13 clotting factors in human blood and tissues. Most of them are made

in the liver. The liver needs vitamin K to make some of these clotting factors. Our bodies cannot make their own vitamin K, so people have to get it in their diet.

Blood clots can also form even if the person does not have any external injuries. For instance, if blood flows too slowly and it starts to build up, large numbers of blood platelets may group together and stick to each other, forming a blood clot. They can also form if the inner walls of blood vessels are damaged, for example in atherosclerosis. Some people have unusually active clotting factors, either because they have an inherited condition or because they have another illness, such as a tumour. Particular medications can have this effect too. This increases the risk of blood clots forming unexpectedly. The medical term for a blood clot is "thrombus".

When are blood clots dangerous?

If a blood clot forms in a vein it is called venous thrombosis. Venous thrombosis usually affects the veins in the lower legs and thighs. The main reason people get this kind of thrombosis in the legs is because they do not get enough movement for a long amount of time – perhaps because they have had a big operation, or have a serious illness or injury. A blood clot in the legs can become dangerous if part of the clot (a so-called embolus) breaks off and blocks a blood vessel in the lungs. The medical term for this condition is pulmonary embolism. Typical signs of pulmonary embolism include sudden breathing difficulties, coughing, coughing up blood, and chest pain. You can read more about the prevention of deep vein thrombosis here (URL: <http://www.gesundheitsinformation.de/deep-vein-thrombosis-dvt->

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When blood clots form in arteries, the tissues and organs that they usually supply with blood no longer get enough blood, or might not get any blood at all. This kind of thrombus usually develops in the coronary (heart) artery or inside the heart. If a thrombus blocks a coronary artery, the person has a heart attack. Blood clots that develop in the heart itself could cause a stroke if they move to the brain and block blood vessels there. You can find out how to recognise the signs of a heart attack here (URL: <http://www.gesundheitsinformation.de/the-signs-of-a-heart-attack->), and the signs of a stroke here (URL: <http://www.gesundheitsinformation.de/signs-of-a-stroke.374.612.e>).

People who have atrial fibrillation have a higher risk of blood clots in the heart. Atrial fibrillation is a certain type of irregular heartbeat, where two of the chambers (called atria) beat very fast and irregularly. This means that blood cannot flow through the heart as quickly and smoothly. Artificial heart valves increase the risk of a thrombus too: their surface is not as smooth as the surface of natural valves, so blood platelets are more likely to attach to them and form a blood clot.

Particular medications or illnesses, such as cancer or coagulation disorders, can also increase the risk of blood clots developing.

What is anti-clotting medication and how is it used?

Anti-clotting medication is used to try to prevent blood clots from forming, and therefore lower the risk of certain cardiovascular diseases like heart attacks and strokes. As the name suggests, they make sure that the blood does not clot as quickly. So the commonly used name “blood thinners” is not, strictly speaking, correct because these drugs do not actually thin the blood. Anti-clotting medications can be divided into two groups:

- anticoagulants – which prevent clotting factors from being made or working properly, and
- antiplatelets – which act on the blood platelets (thrombocytes).

Anticoagulants

The vitamin K agonists, also called coumarins, are among the most commonly used anticoagulants in Germany at the moment. They are very powerful drugs: when people use them it takes a lot longer for their blood to clot. Although the strength of the anticoagulant effect depends on the dose of coumarins used, it can vary greatly from person to person, and also over time for the same person. Because of this, it is important for people to regularly measure the clotting ability of their blood. Coumarins are generally used by people who have a particularly high risk of complications such as strokes, for example because they have artificial heart valves or atrial fibrillation, or because they have had a pulmonary embolism in the past. Phenprocoumon is the most commonly prescribed coumarin in Germany. It is marketed under several brand names, including Marcumar, Falithrom and Marcuphen.

There is another group of anticoagulants called heparins. These drugs directly prevent individual clotting factors from working. This means that the anti-clotting effect is immediate, so this medication is particularly suitable for the treatment of acute problems as well as the prevention of thrombosis, for example after surgery. In order for them to work, heparins have to be injected into the skin or directly into the bloodstream through a vein. They cannot be taken as tablets. Most patients who regularly have to take long-term medication prefer to take tablets rather than inject medication, so heparins are generally not used for long-term treatment.

Other groups of anticoagulants are currently being developed. Two of these newer anticoagulants, called dabigatran and rivaroxaban, have only been approved for certain areas of use. Like heparins, they directly prevent particular clotting factors from working. Unlike heparins and like vitamin K antagonists, however, they can be taken as tablets. People who take them usually do not have to monitor their blood clotting.

Antiplatelets

Antiplatelets are weaker than anticoagulants, but they are also associated with fewer adverse effects like bleeding. They are mainly taken by people who have previously had a heart attack or stroke, in order to lower the risk of complications. The most commonly used antiplatelet drug is acetylsalicylic acid (ASA; the drug in medications like Aspirin). Other antiplatelet drugs include clopidogrel, prasugrel and dipyridamole.

The type of anti-clotting medication that is prescribed will mainly depend on the person’s underlying medical condition. But other things play a role too, such as age, and whether there are other illnesses or risk factors for bleeding. If someone cannot tolerate certain anti-clotting medications, or they are already taking a drug that could interact with a particular anti-clotting medication, that might influence the choice of treatment too. The advantages and disadvantages of the different anti-clotting medications have to be weighed up for each person when deciding which treatment to use. You can talk to your doctor about which medication is most suitable for you.

How do anticoagulants work?

Coumarins prevent particular clotting factors from being made in your body by blocking vitamin K in the liver. The liver needs vitamin K to make these clotting factors.

Anti-clotting medications that work in this way are also called vitamin K antagonists (blockers). It takes about two to four days for coumarins to reach their full effect. This is because they only stop the liver from making new clotting factors, so the effect only becomes noticeable once the clotting factors that were already in the blood have been broken down by the body. Coumarins are particularly suitable for long-term use because they can be taken as tablets.

Pregnant women are only allowed to use coumarins in very few exceptional cases because this medication can be harmful to unborn babies. So it is important that women who take coumarins make sure that they use effective contraception and talk to their doctor if they would like to get pregnant. Women should avoid taking coumarins while they are still breastfeeding too.

Heparins directly and immediately inhibit certain clotting factors. Because of this, they already start working after a few hours – a lot sooner than coumarins do. So heparins are particularly suitable for acute treatment, such as the treatment of venous thrombosis, pulmonary embolism or heart attacks. Another important area of use is the prevention of venous thrombosis in people who need a big operation.

The newer anticoagulants dabigatran and rivaroxaban also directly inhibit a certain clotting factor, and they also start working after a few hours. Like the coumarins, dabigatran and rivaroxaban are available in the form of tablets. It is usually not necessary to monitor blood while using them. In Germany, these drugs are currently only approved for the prevention of venous thrombosis in major hip and knee surgery. There is not enough research on their use in pregnant or breastfeeding women, so women who are pregnant or breastfeeding should not take them. Overall, there is only limited experience with these newer anticoagulants.

How do antiplatelets work?

Antiplatelets reduce the clotting ability of the blood by blocking the function of blood platelets. They stop the blood platelets from attaching to the damaged blood vessel and sticking to each other, and therefore prevent blood clots from forming. Because of this, antiplatelets are also called thrombocyte aggregation inhibitors (thrombocyte = blood platelet, aggregation = sticking together). The best known and best studied antiplatelet medicine is acetylsalicylic acid (ASA).

For many years now it has been known that ASA lowers the risk of blood clots. The older antiplatelet dipyridamole and the newer antiplatelets clopidogrel and prasugrel have a very similar effect to acetylsalicylic acid, even though they work in a slightly different way. You can read about when it can be beneficial to use both ASA and clopidogrel [here](http://www.informedhealthonline.org/index.625.en.html) (URL: <http://www.informedhealthonline.org/index.625.en.html>)

What about adverse effects?

Anti-clotting medication should not stop blood from clotting completely. After all, your blood still needs to clot so that wounds can heal. But if you are on anti-clotting medication, it takes longer for your body to stop any bleeding. Smaller injuries can usually be cared for at home. If you have a more serious injury, though, you might need synthetic clotting factors or vitamin K so that your blood clots faster.

Bleeding is the most common adverse effect of anticoagulant and antiplatelet medications. Light nose bleeds, gum bleeding or bruises on the skin are generally not a problem. But this medication can also cause heavier bleeding that needs to be treated urgently. The following are signs that medical help is needed:

- Heavy, persistent bleeding from the nose or gums
- Large bruises
- Red-coloured urine
- Blood in stool (dark red or black stool)
- Blood in vomit

Strokes are a rare adverse effect of anti-clotting medication. The main symptom is a sudden severe headache, often together with other problems like vision problems, dizziness, paralysis or altered sensation. If someone has these symptoms, it is very important to call the emergency services immediately. Some anticoagulants can cause hair loss or rashes. In very rare cases clopidogrel and heparins can reduce the number of blood platelets to a dangerously low level.

One common way to make the use of anticoagulants safer is to have a medical ID card. These are available in doctors' offices in Germany. They carry information about why you are taking the medication (what medical condition you have), what dose you should take, and who

your doctor is. If you always have the card on you, then in emergency situations, for example, people will know that you are taking anticoagulants. This could help prevent complications.

Can other medications influence the effect of anti-clotting medications?

If you are taking anti-clotting medication it is important to be aware of possible interactions with other medications. Some medications can increase or decrease the effect of anti-clotting medication, which can lead to complications. That is also true for over-the-counter (non-prescription) drugs, as well as herbal products. For instance, there are reports of some Ginkgo biloba and St John's wort products increasing the effect of anti-clotting medication.

Particular care should be taken when using painkillers. Here it is important to know that acetylsalicylic acid is not only used as an antiplatelet medication, but is found in some painkillers too. Other over-the-counter painkillers may have other drugs in them, such as ibuprofen. These can sometimes interfere with the effect of acetylsalicylic acid.

But some painkillers, such as paracetamol (acetaminophen), can be taken together with anti-clotting medication without any interactions. Always talk to your doctor and/or a pharmacist if you are taking anti-clotting medication and another medication too.

What should be kept in mind before surgery and other procedures?

You may have to stop taking anti-clotting medication or change the dose a few days before larger surgical procedures to avoid heavy bleeding. Because of this, if you are going to have surgery or another procedure such as an endoscopy, it is important to let your doctor know well before the procedure that you are taking anti-clotting medication, and discuss what to do. It can also help if you show your medical ID card.

People do not always have to stop taking anti-clotting medication before smaller procedures and dental treatment. But it is still better to talk to your doctor or dentist beforehand just in case, so that he or she is prepared if treatment does lead to problems after all. It is also important to mention your anti-clotting medication before you have injections or vaccines. This is because, for example, an injection into a muscle could cause more

severe bleeding in the muscle.

Does my blood have to be monitored if I take anti-clotting medication?

People who take coumarins like phenprocoumon and warfarin have a higher risk of bleeding because these drugs have a particularly strong effect. This means that people need to have their blood monitored regularly so that the dose can be adjusted if necessary. The aim is to find the right balance, so the blood coagulates more slowly to avoid blood clots, but not too slowly, because then bleeding might be a problem.

People who are on coumarins usually have their blood checked once a week at first. Blood is taken and tested in a laboratory to see how fast it clots. The result is expressed as an INR value, which is short for "international normalised ratio". In the past this value was measured in a different way, using the so-called "quick method". The INR value reflects the blood clotting speed.

An INR around 1 is considered to be normal in people who are not taking anti-clotting medication. This value is higher in people who are taking anti-clotting medication because it takes longer for their blood to clot. An INR value of "2", for example, means that the blood takes two times longer to clot. Different people may have different target INR values, depending on their underlying medical condition and risk factors. If the INR value hardly changes over several consecutive weeks, the blood tests can be done less frequently.

People who have atrial fibrillation usually aim for an INR value somewhere between 2 and 3. If the measured value is higher, for example 3.5, the drug dose is reduced. If it is lower, for example 1.5, the drug dose is increased a bit. This medication works slowly, so it generally takes a few days for the INR value to change.

Antiplatelets such as acetylsalicylic acid also carry on having an effect for a few days after you stop taking them. People who are taking antiplatelets do not need to have their blood monitored.

How can I learn to check my own blood?

Training courses may be available to help you learn how to carry out a blood test at home and measure your own blood clotting speed. The test involves squeezing a drop of blood out of your fingertip, and then using a test strip

and a special device to determine your INR value. It is quite easy to do this at home. This makes it possible for people to monitor their blood and adjust the dose of their medication themselves. People who adjust the dose of their anticoagulant medication themselves usually only have their blood checked by a doctor every couple of months.

Many people find that self-monitoring has advantages because it means that they are more flexible and more independent. One review of research on the self-management of anticoagulant medications even found that it has health benefits: compared to people who had their medication adjusted by a doctor, people who self-managed their medication had fewer complications and a lower risk of problems like strokes. You can read more about self-managing anticoagulant medication here (URL:

<http://www.informedhealthonline.org/index.317.en.html>).

Can other factors such as diet influence the effect of coumarins?

You do not need to change your diet if you start taking coumarins. However, you might have to change the dose of your medication a bit if, for example, you go on a diet while you are taking it. As we mentioned before, coumarins work by blocking vitamin K in the liver, which means that certain clotting factors can no longer be made. Because the concentration of these clotting factors in the blood is related to the amount of vitamin K in the body, diet can also influence blood clotting to some extent. For example, there is a lot of vitamin K in foods like cauliflower, broccoli, beef and pork.

Drinking large amounts of alcohol can affect your INR value, but having an occasional drink is not a problem. Acute and chronic gastrointestinal (stomach and bowel) diseases can also influence the INR value. Exercise, on the other hand, does not have an effect on your blood's clotting ability. Still, it can be a good idea to consider how high the risk of injury is before doing certain types of sports. The main thing to remember, though, is that it is important to measure your INR value more often if you change your diet or other things in your life, or if you are temporarily ill with another medical condition. That way you can detect any changes in the INR value early on and adjust the dose of your medication if necessary.

What can make it easier to take medication?

It can be hard to take medication regularly over a long

period of time, especially if you have several chronic diseases and have to take more than one kind of medication. People might also be less likely to stick to a treatment plan if they do not feel ill. But anti-clotting medication has to be taken regularly, because it cannot lower the risk of complications otherwise.

We have put together information and tools to help you keep an overview of the medication that you are taking and make it easier for you to manage. For example, there is a practical chart for you to print out so that you can write down which medications you should take, and when you should take them. You will find more information about managing medications here (URL: <http://www.informedhealthonline.org/index.405.en.html>)

People feel very differently about the influence that taking anti-clotting medication has on their lives. Some are worried about whether it is still okay for them to carry on doing their hobbies and other activities. Others are afraid that they will not be able to manage their medication properly. Patient education is a good way to learn how to cope with a chronic illness and the treatment needed. It also offers the chance to talk to other people in similar situations. And with a bit of practice and support, many people learn to manage their medication so that taking it becomes a normal part of everyday life.

This additional information has been provided by the U.S. National Library of Medicine:

The U.S. Food and Drug Administration (FDA) has approved the use of dabigatran for the prevention of strokes in patients who have atrial fibrillation. The FDA is reviewing the use of rivaroxaban.

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Glossary

thrombocyte

Thrombocytes or platelets are cells that play an important role in stopping bleeding. The word thrombocyte comes from the Greek "thrombos" meaning a "thick drop" or clot, and "cyte" means cell. If a blood vessel is damaged, thrombocytes line the wall of the vessel. The thrombocytes clump together into a ball. This process is called aggregation. Eventually a clot forms and that stops the bleeding.

coagulation

Coagulation or clotting stops bleeding. Coagulation is a complex process involving several steps. If a blood vessel is damaged, thrombocytes (platelets) line the wall of the blood vessel. The platelets clump together. This process is called aggregation. Clotting factors, which are particular proteins formed in the liver, also travel to the wounded blood vessel. A complex chain reaction including these factors gathers more platelets and repairs the wound. The walls of the wound close together and connective tissue cells help build new tissue.

platelet

Thrombocytes or platelets are cells that play an important role in stopping bleeding. The word thrombocyte comes from the Greek "thrombos" meaning a "thick drop" or clot, and "cyte" means cell. If a blood vessel is damaged, thrombocytes line the wall of the vessel. The thrombocytes clump together into a ball. This process is called aggregation. Eventually a clot forms and that stops the bleeding.

stroke

A stroke (also sometimes called brain attack, or apoplexy, which is Greek for "struck down") is an acute condition where the brain does not get enough oxygen. It is most commonly caused by a blood clot that has travelled through the bloodstream and is blocking blood vessels in the brain. In rarer cases bleeding in the brain may also result in a stroke. Depending on which part of the brain is affected, there may be paralysis of either all or certain parts of one half of the body, facial nerve impairment, vision problems, trouble balancing and severe problems speaking. A stroke is a medical emergency: the parts of the brain that are affected need to be supplied with oxygen as quickly as

possible, to avoid the death of more brain tissue. The risk of having a stroke is greater for older people and people who have hypertension or chronic arteriosclerosis.

atrial fibrillation

Atrial fibrillation is a type of arrhythmia where the heart's atria (the chambers where blood enters the heart) beat very rapidly and irregularly. This is not usually acutely life-threatening, but with time it can increase the risk of having a stroke. This is due to small blood clots that are then more likely to occur in the atria because the normal flow of blood is affected.

Sources

IQWiG health information is based on research in the international literature. We identify the most scientifically reliable knowledge currently available, particularly so-called "systematic reviews". These summarise and analyse the results of scientific research on the benefits and harms of treatments and other health care interventions. This helps medical professionals and people who are affected by the medical condition to weigh up the pros and cons. You can read more about systematic reviews and why these can provide the most trustworthy evidence about the state of knowledge here (URL: <http://www.gesundheitsinformation.de/evidence-based-medicine.61.en.html>) . The authors of the major systematic reviews on which our information is based are always approached to help us ensure the medical and scientific accuracy of our products.

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The German Institute for Quality and Efficiency in Health Care (IQWiG)

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You can find a list of the evidence and other scientific literature on which this information is based at **www.informedhealthonline.org**

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