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## Preventing strokes: Is it better to self-manage anticoagulant medications like warfarin and "Marcumar"?



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When we cut ourselves our bodies make sure that the bleeding soon stops and a clump of blood closes the wound. This happens because blood platelets in the bloodstream attach to the wound and form a blood clot. The body then produces a particular protein with the help of substances called clotting factors or coagulation factors. That protein solidifies the blood clot and makes it stick to the damaged area. This is an important reaction which ensures that we lose as little blood as possible and stops germs from getting into the wound. In some people, however, the blood cells tend to stick together even if they are not injured, and blood clots form inside their blood vessels and heart. These clots are also called thrombi.

A thrombus like this can be dangerous if it is carried away in the bloodstream and gets stuck in a small blood vessel somewhere else in the body, such as in the brain. The thrombus might then block the blood flow to a particular part of the brain, leading to a stroke. If a vessel becomes blocked by something, such as a thrombus, which is carried from one part of the body to another in the blood, it is called an embolism.

Some people are at very high risk of having a stroke caused by a blood clot. They include people who have a special type of irregular heartbeat (a condition called atrial fibrillation) and people who have an artificial heart valve.

## Careful management of anticoagulants lowers the risk

Anticoagulants are drugs that make blood clot more slowly. They are also called blood thinners, but this name is misleading because they do not actually make blood thinner. In many countries, the most commonly used anticoagulants contain the active ingredient warfarin. In Germany, the ingredient phenprocoumon is the most commonly used ingredient in anticoagulants, marketed under the brand names Marcumar, Falithrom or Marcuphen.

Taking anticoagulants regularly could help reduce the risk of a blood clot forming and causing a stroke. But this also increases the risk of bleeding. Light bleeding, such as nose bleeds or bruises on the skin, are generally not a problem. But in rare cases it can lead to more serious bleeding in the

brain, which can cause a stroke. Bleeding near the spinal cord can be dangerous too.

This means that using anticoagulants is not always very easy. The drug needs to be taken at just the right dose. If the dose is too high, people will have a higher risk of bleeding. But if the dose is too low, they will not be properly protected against blood clots. You can read more about the safe use of anti-clotting medication here (URL: <http://www.informedhealthonline.org/index.624.en.html>) .

## Dose adjustment requires regular blood monitoring

To keep the anticoagulant dose just right, people's blood needs to be checked regularly and the drug dose changed accordingly. This testing and adjustment is usually done by a doctor during regular visits. However, people who are taking anticoagulants can learn to use a machine to test their own blood (self-monitoring). Based on the results of the blood test, they can then adjust the dose of their drug themselves (self-adjustment of medication). The test measures how fast your blood clots. The result is expressed as an INR value, which is short for "international normalised ratio". In the past, a test called the quick method was used to measure blood clotting speed.

An INR around 1 is considered to be normal. People taking an anticoagulant will use the drug to try to increase their INR to a value somewhere between 2 and 3. An INR value of 2, for example, means that the blood takes two times longer to clot. So taking anticoagulants does not mean that you will not be able to stop bleeding, it just means that your blood will clot more slowly.

Increasing the dose of the medication will move the INR up, while lowering the dose will lower the INR. But because the effect of the medication lasts a very long time, this sometimes only happens after a few days. Adjusting the dose makes it possible to keep a person's INR at the best level to prevent a stroke or haemorrhage.

The advantage of self-managing medication is that it can be more convenient than regularly visiting a doctor. This could mean that people test their own blood more often and so keep the dose closer to the right level more of the time. If so, that could improve the control of blood clotting and better protect people from strokes and other clot-related problems.

### **Comparing self-management and management by doctors**

To find out what effects the self-management of oral anticoagulation has, researchers from the Cochrane Collaboration looked for relevant clinical trials. The Cochrane Collaboration is an international network of researchers who review trials that test the benefits and harms of health care interventions. The researchers found 18 trials that, taken together, provided enough reliable data to assess the advantages and disadvantages of self-managing anticoagulant medication.

The trials compared people who managed their own medication at home with people who had their dose managed by someone else, for example by their doctor or a specialist in an anticoagulation management clinic. In most of the studies the effects of self-management were looked at for a time period of six months or more. Everyone in the trials took anticoagulants, but they did not all have the same health problems.

Altogether, there were just over 4,700 people in the trials. Most of them were between 50 and 70 years old, but some were older or younger. In some of the trials, the participants monitored their own blood, but the dose of their medication was still managed for them by a doctor. In other trials, the participants adjusted the dose of their medication themselves as well. The results of these trials were compared with the results of trials in which people's blood was monitored and their drug dose managed by a doctor. People who were self-managing were trained in how to do a coagulation test and adjust their medication dose properly.

The combined results of the trials showed that self-monitoring achieved better results overall, particularly if the patients were also adjusting their medication doses in response to what they were seeing in their INR results. Whether people were self-monitoring only, or also self-adjusting their anticoagulant dose, the risk of a blood vessel being blocked by a clot (thromboembolic event) was reduced: overall, the rate dropped from 4% to 2%. In other words, this only happened in 2 out of 100 people rather than in 4 out of 100 people.

People who managed the dose of their medication themselves too benefited a bit more than those who only monitored their blood: the self-management group also reduced their risk of dying by almost 2%. Their risk of bleeding did not increase: it was about the same as it was in the group of people whose anticoagulant dose was

managed by their doctor.

The people who only self-monitored their blood, with doctors still adjusting their medication, had a slightly lower risk of bleeding than those who adjusted their own medication. But their risk of having a blood clot that blocks a blood vessel also decreased less. The people who only self-monitored may also have reduced their risk of dying somewhat, but larger trials are needed to be sure about this.

### **Better protection with self-management**

Overall, the research showed that people who self-monitored and self-adjusted their medication achieved a higher rate of protection from the danger of clots than people who self-monitored only (without self-adjusting their dose) or whose treatment was completely managed by doctors. Self-adjusting medication did not increase the risk of serious bleeding. Both self-monitoring only and self-monitoring plus self-adjustment of medication led to better health outcomes than treatment that was managed by doctors only.

Many people were able to learn how to manage their own anticoagulation treatment, regardless of their age. But some people found it too difficult to do, or it made them feel anxious. Others were unable to manage their own medication because of things like vision problems. Self-management was a bit harder for people who were already used to their doctor managing their therapy than it was for people who were just starting to take anticoagulant medication. In some of the trials, people attended group training sessions as well as getting help from their own doctor. The people in those trials seemed to find it easier to keep self-managing.

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## Glossary

### Cochrane Collaboration

The Cochrane Collaboration is an international network of thousands of researchers and others. They work together in teams called Cochrane Review Groups to answer questions about health care by doing systematic reviews of evidence. To achieve this, the members of the Collaboration have developed systems and methods for systematically finding and analysing the results of trials of health care interventions. The goal of the Cochrane Collaboration is to help patients, health care practitioners and others make more informed decisions about health care. You can read more about the Cochrane Collaboration at their website.

### 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.

### 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.

Garcia-Alamino JM, Ward AM, Alonso-Coello P, Perera R et al. Self-monitoring and self-management of oral anticoagulation. *Cochrane Database of Systematic Reviews* 2010, Issue 4. [Cochrane summary (URL: <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003839/frame.html>) ]

Heneghan C, Perera R, Ward AA, Fitzmaurice D et al. Assessing differential attrition in clinical trials: self-monitoring of oral anticoagulation and type II diabetes. *BMC Med Res Methodol* 2007; 7: 18. [Full text (URL: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1876242/pdf/1471-2288-7-18.html>) ]

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

The German Institute for Quality and Efficiency in Health Care (IQWiG) was established by legislation to provide evaluations of the effectiveness, quality and efficiency of healthcare services. This includes the assessment of medicines as well as the publication of health information for consumers and patients.

## **Evidence basis of our health information**

Our information is based primarily on systematic reviews of the effects of health care. Systematic reviews are necessary to gain an objective picture of health care. In order to do this, a clear question is formulated. Researchers then find all the relevant studies that could answer this question. They then evaluate those studies.

You can find a list of the evidence and other scientific literature on which this information is based at **[www.informedhealthonline.org](http://www.informedhealthonline.org)**

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