Blood Thinning in Atrial Fibrillation (AF)

Providing information, support and access to established, new or innovative treatments for Atrial Fibrillation

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Glossary

**Antiarrhythmic drugs** Drugs used to restore/maintain the normal heart rhythm.

**Anticoagulant** Drugs which help to thin the blood, and reduce the risk of blood clots in the circulation.

**Arrhythmia** Heart rhythm disorder.

**Atrial fibrillation (AF)** Irregular heart rhythm.

**Cardiologist** A doctor who has specialised in the diagnosis and treatment of patients with a heart condition.

**Catheter ablation** A treatment which destroys a very small area inside the heart causing the AF.

**Electrophysiologist (EP)** A cardiologist who has specialised in heart rhythm disorders.

**Sinus rhythm** Normal rhythm of the heart.

**TIAs** Transient Ischemic Attacks.

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What is atrial fibrillation?

Atrial fibrillation is the most common heart rhythm disturbance. It is a condition that is more common with advancing age and if untreated can lead to serious complications such as heart failure and stroke.

Atrial fibrillation results from a disturbance in the electrical conduction pathways in the heart (Figure 1). This leads to an irregular pulse which can often be quite rapid. This may contribute to symptoms of palpitations, shortness of breath, chest discomfort, light headedness, fainting or fatigue, although some patients have no symptoms. The goal of treatment in AF is to minimise the symptoms caused by the irregular rhythm and to reduce the significant risk of stroke. In some people to minimise the symptoms of atrial fibrillation may require a return to normal rhythm, however this return to sinus rhythm does not remove the risk of stroke which is currently thought to be life long.
Why do people with AF need to have their blood thinned?

When the heart is in AF, there are changes in the upper chambers (atria) which means that they no longer contract properly. It is these changes that make the blood more likely to clot there. Some of these changes can be seen on a heart scan or other investigations and others cannot easily be detected.

However in all people with AF these changes mean the blood is more likely to form small clots in the heart. If these clots move out of the heart and in to the circulation then they can block the blood vessels that supply the brain and cause a stroke.

AF increases the risk of a stroke by up to 500%. It is therefore very important that an AF patient at high risk of stroke is prescribed an anticoagulant which will help to thin the blood and so reduce the risk of clots forming and causing a stroke.
Clots are made up of two main components from the blood. These are:

(i) platelets, which are small sticky cells that exist in larger numbers in the blood. These are involved in forming scabs or suddenly sticking together in coronary arteries as a cause of heart attacks.

(ii) Fibrin, which is a long protein that binds together to form clots. This initially exists in the blood as fibrinogen. The fibrinogen is not active and will not form clots until it is stimulated. Clearly forming clots at the wrong time is not good for the body.

To prevent the fibrinogen being stimulated at the wrong time there is a complex system that needs to be triggered to cause the fibrinogen to be converted into fibrin. This process is called the ‘clotting cascade’

Antiplatelet drugs such as aspirin and clopidogrel stop the activation of platelets and are known as antiplatelet agents. Although antiplatelet medication has been used for many years in stroke prevention in AF, current thinking is that more effective prevention is provided by alternative medications as discussed below.

The blood can be thinned to different degrees by affecting each of these components. Anticoagulants act to stop the formation of fibrin, these drugs include warfarin, dabigatran, rivaroxaban and heparin.
By inhibiting the formation of the fibrin network, anticoagulants act to thin the blood very efficiently and can reduce the risk of stroke by about two thirds.

**Warfarin**

Warfarin acts on the liver to prevent the formation of the proteins that go on to create fibrin. As our bodies have stores of these proteins that last a few days warfarin will only start to thin the blood efficiently after a few days. In the same way when you stop warfarin it takes the body a couple of days to replace these proteins and so the blood thinning effect will remain for a few days after you stop.

As well as acting on the liver, warfarin is removed from our bodies by the liver. We are all slightly different in how efficiently our liver removes warfarin as we are all slightly different in age, size and sex, and we all eat different foods, take different medications and drink different amounts of alcohol. This is why the dose of warfarin needs to be tailored to each individual and is also why the dose of warfarin needed can change from time to time, for instance drinking more alcohol when on holiday or taking a course of antibiotics for an infection. The effectiveness of warfarin is measured by the INR (international ratio) which compares how fast blood clots compared to an international standard. Normal blood clots at ‘fast’ as the international standard, so has an INR of one.

To prevent the risk of stroke in AF the blood needs to be two-three times thinner, so that it takes two to three times longer to clot than the standard i.e. has an INR of two-three. By measuring the INR, anticoagulant clinics ensure that your blood is thinned to just the right amount. Too little warfarin (INR<2) won’t have the full benefit of preventing strokes, whereas too much warfarin (INR>3) thins the blood too much and can put you at risk of bleeding heavily when you cut yourself and of bruising badly when you fall.

When you first start taking warfarin you will attend the anticoagulant clinic weekly as they adjust your dose to suit you. Most people find once they are established on warfarin their INR is pretty stable and they need only attend the clinic every six-eight weeks. However, you have to watch out for things that can
affect your warfarin level to keep it stable. One of these is alcohol. Taking alcohol in itself is not a large problem, but changing your average intake will alter the effect of the warfarin and thus your INR level. Another thing you have to watch out for is medications including cough remedies, herbal cures and many other over-the-counter medications. In short you are fine to have a couple of paracetamol for a headache but anything else you should seek advice from your doctor or chemist.

As your warfarin level can change without you realising it, you should take care to avoid cuts and bruises; for instance use a thimble if you are sewing, use an electric razor when shaving, etc. This all can sound a bit daunting but the vast majority of people who take warfarin do so without any problems. Please see AFA factsheets ‘Warfarin and Diet’ and ‘Warfarin and Other Medication’.

**Dabigatran**

This is a novel anticoagulant therapy which has been shown to be non-inferior to (at least as effective as) warfarin in a large international study. Unlike warfarin it only affects one part of the clotting cascade, the final step as fibrinogen is converted to fibrin to produce a clot.

Unlike warfarin it has a stable dose which is taken twice daily. The dose taken will be discussed and decided by the clinician dependant on your age and other factors such as your kidney function. It unfortunately cannot be monitored, as it does not have a test similar to the INR for warfarin. At this time there is no known antidote, however its effects are short lived compared to warfarin.

**Rivaroxaban**

This is a novel anticoagulant therapy which has been shown to be non-inferior to warfarin in a large international study. Unlike warfarin it only affects one part of the clotting cascade. However this is higher up the cascade than dabigatran. Unlike warfarin it has a stable dose which is taken once daily. The dose taken will be discussed and decided by the clinician dependant on your age and other factors such as your kidney function.
It unfortunately cannot be monitored, as it does not have a test similar to the INR for warfarin. At this time there is no known antidote, however its effects are short lived compared to warfarin.

**Heparin**

At present heparin-based products can only be given by injection either into the skin or veins, so are not useful for long-term blood thinning. Heparin thins the blood by blocking the proteins that form fibrin, i.e. it does not affect the production of these proteins but blocks them immediately. This gives heparin the great advantage of being quick to act (i.e. effective immediately) and quick to stop (hours to half a day dependant on the type). Therefore heparin is very useful when the level of blood thinning needs to be changed quickly. For example some people when they first develop AF are very much at risk of a stroke and will be started on heparin to protect them immediately. Another example is in preparation for surgery or other invasive procedures; warfarin will be stopped and heparin given instead until the day of the procedure.

**Clinical flowchart for the use of oral anticoagulation in AF**

AF = atrial fibrillation; OAC = oral anticoagulant; TIA = transient ischaemic attack

† Congestive heart failure, Hypertension. Age ≥ 75 years Diabetes. Stroke/TIA/thrombo-embolism (doubled)

* Other clinically relevant non-major risk factors: age 65-74, female sex, vascular disease

Current Guidance Regarding Stroke Risk from the European Cardiac Society 2010 Guideline
The choice of which drug is best for you depends on: (i) your personal risk of stroke and (ii) if any interventions such as cardioversion or ablation are planned.

**Personal stroke risk**

It is clear that if you are under 65 years with no other risk factors, so called ‘Lone AF’, then your personal stroke risk is so low that stroke preventative medication is unnecessary and further scoring is not required.

By looking at large groups of people with AF and seeing who develops stroke it has become possible to identify certain things which increase an AF patient’s risk of stroke. Some of these factors have been made into scoring systems such as the stroke risk stratification algorithm in the current European Cardiac Society Guideline. In this system patients are assessed with various major risk factors (age over 75 or previous stroke) or several minor factors (such as other heart disease or age over 65) as to whether they require anticoagulation.

**Assess your personal risk score (CHA₂DS₂-VASc)**

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
<th>Your Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you over 75?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Are you over 65-74?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Are you over 65 and female?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Do you have high blood pressure?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Do you have diabetes?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Do you have heart failure?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Do you have angina, suffered a heart attack or have circulation problems including problems with the aorta?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Have you suffered a stroke (even a mild stroke)?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The aorta is the large blood vessel in the abdomen that can become ‘dilated’ or swollen forming what is called an ‘aneurysm’.
Your annual risk of stroke rises from 0% a year with no risk factors to over 10% a year for five or six. Most experts who have looked at this scoring scheme (the CHA$_2$DS$_2$VASc score) would suggest that the benefits of taking anticoagulation medication out way risks if you have a CHA$_2$DS$_2$VASc score of one or more.

If you are going to undergo a procedure to return your heart to normal rhythm then you will require anticoagulation, and risk scoring is not required at that time. The anticoagulation will need to be considered again after your procedure.

If your risk score is suggesting you are at risk of stroke and require long-term anticoagulation then procedures to return your heart to its normal rhythm do not reduce this risk. You will often find in this setting that your rhythm specialist will not want to discontinue your anticoagulation after the procedure.

However the decision to use anticoagulation in the long term for stroke reduction in AF is made on each individual case, in discussion with the AF sufferer and this booklet should be seen as an information guide to assist in that discussion.

Although aspirin and clopidogrel have a minimal role in preventing strokes due to atrial fibrillation, they can be very important in people who have suffered a heart attack, under gone angioplasty or have angina. In this setting some people may need to take aspirin and an anticoagulant, or even on all three agents. This decision would require careful consideration and would be made on each individual case.
How long do I need to take the drug?

As the decision of which blood thinning medication is determined by things other than the presence of AF, patients will usually stay on their blood thinning medication for life. There are a few situations where a patient’s blood thinning medication will be changed for a short period of time, for example if you develop problems with bleeding from somewhere such as an active ulcer, you may well switch onto clopidogrel whilst your ulcer is being treated and cured. In the event of a person suffering a stroke while taking aspirin, then most likely your blood thinning medication would be changed, at least temporarily, to warfarin. Another exception to the rule is interventions that try to return the heart to normal sinus rhythm such as cardioversion or AF ablation.

Another exception may include prescribing anticoagulation for a procedure such as cardioversion or catheter ablation. Interventions which aim to return the heart to sinus rhythm (regular heart rhythm), allow the atria to start contracting properly. In this situation clots within the atria are at risk of being dislodged, and this will enable them to travel in the blood stream to the brain and cause a stroke. To reduce this risk, patients who are normally considered at low risk of stroke and so may only be taking an antiplatelet drug to reduce their risk of stroke, will have to temporarily take warfarin, both leading up to and for a while after these procedures have been carried out.

Further information on both of these procedures is available from the Atrial Fibrillation Association.
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If you would like further information or would like to provide feedback please contact AFA. Please remember that this publication provides general guidelines only. Individuals should always discuss their condition with their own doctor.

This booklet is intended for individuals affected by atrial fibrillation. Information within this booklet is based upon clinical research and patients’ experiences.