Atrial fibrillation (AF) is a rapid and irregular rhythm disturbance of the upper chambers of the (atria) heart overriding the normal heart pacemaker. The atria can beat in excess of 300 beats per minute (bpm). The lower chambers (ventricles) try to keep up with the atria, but are irregular and often in the range of 100-200bpm. The rate in the ventricles is often slowed when patients are on medications, but the atria remain rapid.

**DIFFERENT PATTERNS OF ATRIAL FIBRILLATION:**

Three patterns of atrial fibrillation are recognized:
- **Paroxysmal** - episodes come and go on their own
- **Persistent** - episodes come and usually last until the person is put back into normal rhythm
- **Permanent** - the heart stays in atrial fibrillation despite efforts to convert it back to normal rhythm

**WHAT ARE THE SYMPTOMS OF ATRIAL FIBRILLATION?**

Atrial fibrillation can be free of any symptoms in some people, but can cause uncomfortable symptoms in other people. Possible symptoms include:
- **Palpitations** - an awareness of the heart beating differently to normal
- **Shortness of breath** - especially on exertion
- **Fatigue or tiredness** - usually during the episodes of atrial fibrillation
- **Chest discomfort or pain** - because the heart is not beating as efficiently
- **Dizziness or lightheadedness** - especially during more rapid episodes of atrial fibrillation
- **Syncope** - passing out or fainting

Atrial fibrillation is not a life-threatening arrhythmia, but it can be extremely annoying and sometimes dangerous. Blood is not pumped through the heart normally during AF and this may lead to an increased risk of blood clots and strokes. Effective treatment for atrial fibrillation returns the heart to a normal rhythm or controls the heart rate, and reduces the risk of blood clots and strokes.


**WHAT ARE THE RISK FACTORS?**

Sometimes there is no obvious cause for the atrial fibrillation to develop. This is more common in younger people with no evidence of any other heart disease on testing such an echocardiogram or exercise stress test. This is often called “Lone atrial fibrillation”. For others, a wide range of risk factors may contribute to the atrial fibrillation.

These risk factors include:
- Diabetes
- High blood pressure
- Coronary heart disease
- Mitral valve disease
- Thyroid disease
- Chronic lung disease
- Recent open-heart surgery
- Advancing age
- Excessive alcohol consumption

**HOW IS ATRIAL FIBRILLATION DIAGNOSED?**

A careful examination and thorough review of the medical history by a physician are crucial to the diagnosis of atrial fibrillation. The diagnosis is often suspected during the clinical examination, but an electrocardiogram (ECG) confirms the diagnosis. If the atrial fibrillation is paroxysmal, then your doctor might need to monitor your heart rhythm over a period of time with a Holter monitor or event recorder.

Other investigations used to assess people with atrial fibrillation include an:

- **Echocardiogram** - an ultrasound to look at the structure and function of the heart, especially the left atrium, the left ventricle and the mitral valve.

- **Transoesophageal echocardiogram** - another ultrasound using a small probe swallowed down the oesophagus which runs behind the heart. This gives very clear views of the heart chambers and valves. It is especially useful for identifying blood clots in the heart.

- **Exercise stress test** - to assess the heart rate response in atrial fibrillation and exclude obvious coronary artery disease.

- **Cardiac electrophysiology study (EPS)** - is performed under sterile conditions and in the safety of a hospital. During the procedure, tiny electrodes are introduced into the heart via veins in the groin. These electrodes record the heart’s electrical activity. Electrical impulses might be delivered to intentionally provoke a fast heart rate. This allows analysis of the pattern of a particular rhythm.
There are three main goals of treatment:

- **Restore the heart’s normal rhythm** - if atrial fibrillation is not treated, it can eventually weaken the heart muscle and cause permanent damage. Restoring the heart’s regular rhythm can relieve the symptoms of atrial fibrillation and prevent dangerous blood clots from forming.

- **Control the heart’s rate during atrial fibrillation** - controlling rapid heart rates allows the heart to pump oxygen-rich blood efficiently, relieves some or all symptoms and protects against a weakening of the heart muscle. Controlling the rapid heart rates, however, does not address the underlying arrhythmia or the risk of clots and strokes.

- **Anticoagulation medications** - to reduce the risk of clots and strokes, blood thinning medications such as warfarin (Coumadin or Marevan) are often used. These anticoagulants require regular blood tests to monitor the effectiveness and avoid the risk of bleeding. The aim is to maintain an INR (the blood test that indicates how thinned out the blood is) between 2 and 3.

What are the treatment options?

Today a number of treatment options are available, including:

- **Medication** - besides the use of blood thinners, there are two types of medications that are used to treat atrial fibrillation.
  - One type of medication is intended to restore the heart’s normal rhythm and try to prevent recurrence of the atrial fibrillation. Medications such as sotalol (Sotalol or Cardol), flecainide (Flecatab or Tambocor) and amiodarone (Cordarone or Aratac) are used with this aim in mind.
  - Other types of medication do nothing to restore the heart’s normal rhythm. Examples of these rate controlling medications include digoxin (Lanoxin), beta-blockers such as atenolol (Noten or Tenormin), metoprolol (Betaloc, Lopressor or Toprol), propranolol (Inderal or Deralin), Carvedilol (Dilatrend), and calcium blockers such as verapamil (Isoptin or Veracaps), and diltiazem (Cardizem).
  - All of the medications used to treat atrial fibrillation may have side effects. An adjustment of the dosage, or change to another medication is often necessary.
Medications may reduce the frequency of, or even eliminate, episodes of atrial fibrillation in some people, but it will recur in many people. The medications do not cure the atrial fibrillation. If a patient who is responding well to a medication stops taking it, the atrial fibrillation will return.

**Electrical Cardioversion (DCCS)** - when medications fail to restore the heart’s normal rhythm, an electric shock can be delivered to the chest wall to restore the heart’s normal rhythm. This is performed under a brief general anaesthetic (GA) for comfort. It is an effective way to restore the heart’s normal rhythm, but only if the atrial fibrillation has not been present for a long time. It is important that there are no clots in the atria before the cardioversion, or there is a risk that clot could leave the heart and travel to the brain or some other part of the body. Blood clots become a concern whenever the atrial fibrillation has been present longer than 48 hours particularly. If so, it is safest to be on adequate anticoagulation for at least 3 weeks before the cardioversion, and for at least a month after the cardioversion if the heart’s normal rhythm is maintained. If this is not possible or practical, then the transoesophageal echocardiogram can be used to identify whether there are any clots in the heart. Just like with medications, the atrial fibrillation can recur after the cardioversion. Medications are often used to reduce the likelihood of a relapse.

**Pacemaker Therapy** - while medications are often the preferred treatment, sometimes implanted pacemaker devices are used to treat people with atrial fibrillation. Pacemakers are usually implanted in people whose heart beat is slower than it should be. This can be seen in people with the Sick Sinus Syndrome (SSS) where episodes of atrial fibrillation are separated by periods of very slow heart rhythms. The frequency of paroxysmal atrial fibrillation is often reduced after a pacemaker is implanted in such people, or in people where the heart is slowed significantly by the medications used to try and prevent the atrial fibrillation. Newer types of pacemakers have special algorithms to try and quickly terminate episodes of atrial fibrillation by bursts of rapid stimulation. The success rate of this type of pacemaker for preventing and treating atrial fibrillation is fairly low, and therefore this type of pacemaker is not implanted unless the person has a slow heart rate and the usual indications for receiving a pacemaker.
Implantable Cardioverter Defibrillator (ICD) - is similar to a pacemaker, is inserted similarly and has similar functions, but in addition can perform an internal cardioversion. It is usually used for life threatening arrhythmias effecting the ventricles (such as ventricular tachycardia or ventricular fibrillation) but can also be used to treat atrial fibrillation. It is not a popular form of therapy, because the shocks used to treat atrial fibrillation are painful. If their atrial fibrillation recurred the person would receive frequent shocks. Medications were therefore still necessary to reduce the likelihood of shocks.

Surgical Ablation - The Maze procedure, or modifications thereof, are an effective surgical treatment of atrial fibrillation. They involve an incision in the centre of the chest going from the top to the bottom of the breastbone (sternum). A heart-lung bypass machine is required to maintain the circulation during the operation. The surgeon uses a combination of incisions, freezing (cryoprobe) and cauterization (radiofrequency) to create lines in the atria that interrupt the abnormal electrical signals to prevent further atrial fibrillation. The success rate varies from 70-90%, but the procedure does mean 7-10 days in hospital and up to 3 months convalescing after the surgery. There are associated risks, and therefore the procedure is usually limited to those who require open-heart operations for other reasons, such as coronary artery bypass surgery or valve surgery, and the atrial fibrillation ablation is performed at the same time as an adjunct to the main surgery.

Catheter Ablation - there is a range of catheter ablations that can be performed to help people with atrial fibrillation. These include:

Atrial flutter ablation - some people with atrial fibrillation have a more organised form of the arrhythmia known as atrial flutter (AFL). This may occur of its own accord, or be as a result of medications being taken for the atrial fibrillation. The medications organise an otherwise chaotic atrial fibrillation into the more organised atrial flutter, but cannot quite restore the heart’s normal rhythm. Most people cannot tell the difference between these similar arrhythmias. The atrial flutter often occurs as a result of a short circuit in the right atrium
and can be cured with the use of radiofrequency (RF) energy. The procedure has a high success of curing the atrial flutter (95%) and a very low risk of complications (<1%). Complications can include clots and perforation of the heart. Atrial fibrillation can recur even when the atrial flutter has been cured.

**Atrio-Ventricular Node Ablation (AVN)** - the AV node is where the atrial and ventricular electrical systems meet. Catheters deliver radiofrequency energy at this point and eliminate the electrical conduction from the rapid irregular atria to the ventricles. The ventricles will beat very slowly, at about 30bpm, but a pacemaker is required to maintain a regular and sufficient pulse. The success rate is very high (99%) with a very low complication rate (<1%). This procedure results in a very regular pulse, but does not “cure” the atrial fibrillation. The heart rate is well controlled reducing the risk of weakening of the heart muscle, most symptoms are alleviated and many medications can be stopped. The atria still fibrillate, however, and there is a risk of clots forming. It is therefore important to remain on anticoagulants (warfarin) to reduce this risk of strokes.

**Atrial fibrillation ablation** - left atrial ablation is a catheter ablation technique intended to cure atrial fibrillation without the need for major surgery. Specially designed catheters are positioned in the left atrium and radiofrequency (RF) energy is applied to the heart muscle to create scars that disrupt and prevent atrial fibrillation. This type of procedure may be effective for either paroxysmal or permanent atrial fibrillation, however, will not be effective in all people, particularly if the left atrium is very enlarged. The procedure is generally reserved for people who have significant symptoms from the atrial fibrillation and have failed medications. The likely success rate is in the order of 60-70%, and up to 25% of people will require a second procedure. The risks of complications are around 1-2%. Possible complications include:

- Bruising and bleeding
- Blood clot formation that could lead to strokes or other damage
- Damage to the heart’s conduction system that could rarely require pacemaker implantation
- Puncture of the heart from the catheters or the ablation
- Narrowing of the veins that carry blood from the lungs to the heart (Pulmonary vein stenosis)
- Rarely, complications could lead to death
IMPORTANCE OF TREATMENT:

At one time, atrial fibrillation was considered harmless. Although it isn’t life threatening, it is associated with blood clots and a five-to-seven-fold increase in stroke. It is also linked to chronic fatigue and heart failure, a condition in which the heart is unable to pump enough blood to the other organs and fluid accumulates in the body. The good news is that these risks can be reduced drastically if properly monitored and treated. Discuss these options with your Cardiologist to determine and implement the best course of action for your needs.