

For the Primer, visit [doi:10.1038/nrdp.2016.16](https://doi.org/10.1038/nrdp.2016.16)

➔ **Atrial fibrillation (AF) is the most common cardiac rhythm disorder. It occurs when electrical impulses in the heart become disorganized leading to a rapid and irregular heart rhythm. People with AF have a four- to fivefold increased risk of stroke and a two- to threefold increased risk of heart failure.**

**DIAGNOSIS**

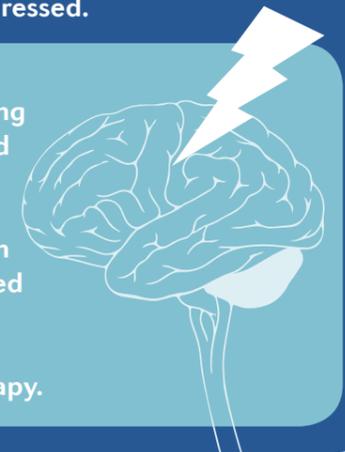
Symptoms of AF include palpitations, fatigue, dizziness, lightheadedness and dyspnoea. They are non-specific and are often not present.

Diagnosis of AF is made by first checking a patient's pulse and then confirming it with a 12-lead electrocardiogram (ECG), which detects the electrical activity of the heart through electrodes placed on the skin. In AF, the space between the activation of the ventricles (QRS complexes) is 'irregularly irregular' and there is often an absence of coordinated atrial contraction (P-waves) prior to ventricular contraction.

**Rx MANAGEMENT**

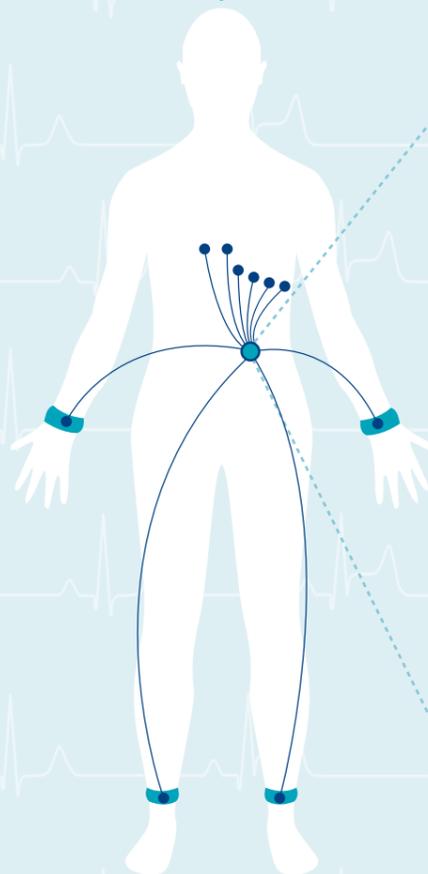
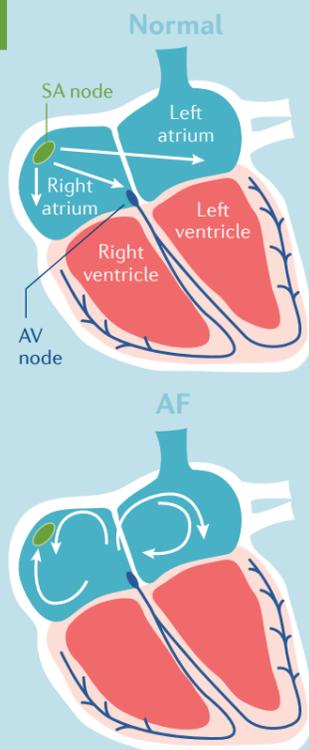
Treatment of AF involves strategies to achieve a normal heart rate, restore normal rhythm and reduce the risk of stroke, which is the most important priority for AF management. Rate controlling drugs such as  $\beta$ -blockers usually act to modulate the activity of the SA and AV nodes. Rhythm control can be achieved either using antiarrhythmic drugs or the catheter-based introduction of lesions to ablate AF triggers and modify AF substrates. Finally, patients with AF commonly have comorbid conditions, the risk factors for which must also be appropriately addressed.

! Ineffective blood pumping raises the likelihood of coagulation and thrombosis. As a result, patients with AF have an increased risk of stroke and often require oral anticoagulant therapy.

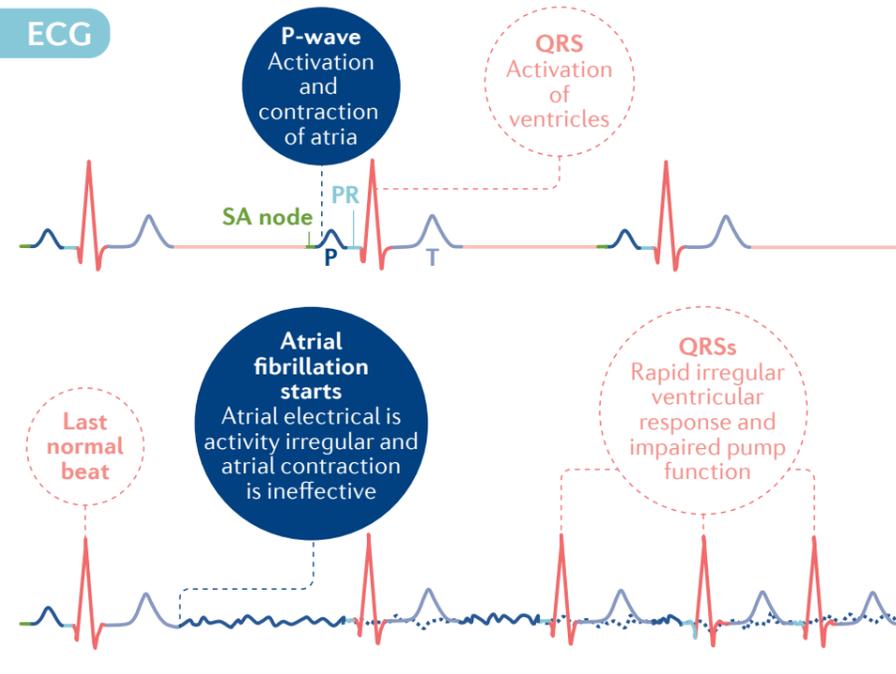


**MECHANISMS**

Efficient pumping of blood by the heart relies on the coordinated activity of the atria and ventricles, which involves contraction of cardiomyocytes in response to membrane depolarization. Electrical impulses begin in the sinoatrial (SA) node and first propagate through the atria, then pass through atrioventricular (AV) node (which delays their transit) and enter the ventricles, causing sequential cardiomyocyte contraction. In AF, the electrical activity in the atria is rapid and irregular. As a result, there is no coordinated atrial contraction and, depending on the filtering effect of the SA node, the response of the ventricles can also be rapid and irregular. Although several explanations have been put forward for this disordered atrial activity, AF fundamentally involves atrial remodelling that generates ectopic foci or 'triggers' — additional sources of electrical impulses — and mechanisms that act to maintain inappropriate conduction within vulnerable 'substrates'.



**ECG**



**EPIDEMIOLOGY**

Globally, in 2010 an estimated 20.9 million men and 12.6 million women had AF, and in developed countries AF is thought to be present in 3–6% of those admitted to hospital with acute conditions. Risk factors for



As 12-lead ECG is not cost-effective on a large scale, future population screening for AF might involve oscillometry, smartphone cameras or hand-held ECG rhythm strips

developing AF include conditions that have been found to promote atrial remodelling, such as heart failure, ischaemic heart disease, hypertension, obesity and obstructive sleep apnoea. In addition, AF is associated

with other classic cardiovascular disease risk factors such as diabetes, advanced age, male sex, alcohol consumption and smoking. In developing countries, rheumatic heart disease often contributes to AF.

**OUTLOOK**

Improved understanding of the mechanisms that trigger and maintain AF — such as changes in intracellular calcium ion handling, subtle alterations in atrial structure and genetic factors — might lead to better strategies to prevent or treat the condition, whereas advances in catheter ablation will likely broaden the subset of patients who are eligible to undergo this procedure. In addition, although rates of stroke in patients in AF are declining owing to improved management, the identification of asymptomatic patients remains a challenge that might be addressed through new approaches to community-based screening.