

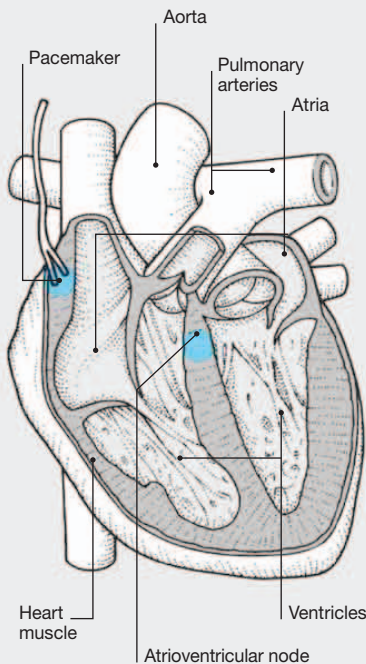
ANTI-ARRHYTHMICS

The heart contains two upper and two lower chambers, which are known as the atria and ventricles (see p.53). The pumping actions of these two sets of chambers are normally coordinated by electrical impulses that originate in the pacemaker and then travel along conducting pathways so that the heart beats with a regular rhythm. If this coordination breaks down, the heart will beat abnormally, either irregularly or faster or slower than usual. The general term for abnormal heart rhythm is arrhythmia.

Arrhythmias may occur as a result of a birth defect, coronary heart disease, or other less common heart disorders. A variety of more general conditions, including overactivity of the thyroid gland, and certain drugs – such as caffeine and anticholinergic drugs – can also disturb heart rhythm.

SITES OF DRUG ACTION

Anti-arrhythmic drugs either slow the flow of electrical impulses to the heart muscle, or inhibit the muscle's ability to contract. Beta blockers reduce the ability of the pacemaker to pass electrical signals to the atria. Digitalis drugs reduce the passage of signals from the atrioventricular node. Calcium channel blockers interfere with the ability of the heart muscle to contract by impeding the flow of calcium into muscle cells. Other drugs such as quinidine and disopyramide reduce the sensitivity of muscle cells to electrical impulses.



A broad selection of drugs is used to regulate heart rhythm, including beta blockers, digitalis drugs, and calcium channel blockers. Other drugs used are disopyramide, lidocaine, and procainamide.

Why they are used

Minor disturbances of heart rhythm are common and do not usually require drug treatment. However, if the pumping action of the heart is seriously affected, the circulation of blood throughout the body may become inefficient, and drug treatment may be necessary.

Drugs may be taken to treat individual attacks of arrhythmia, or they may be taken on a regular basis to prevent or control abnormal heart rhythms. The particular drug prescribed depends on the type of arrhythmia to be treated, but because people differ in their response, it may be necessary to try several in order to find the most effective one. When the arrhythmia is sudden and severe, it may be necessary to inject a drug immediately to restore normal heart function.

How they work

The heart's pumping action is governed by electrical impulses under the control of the sympathetic nervous system (see Autonomic nervous system, p.35). These signals pass through the heart muscle, causing the two pairs of chambers – the atria and ventricles – to contract in turn (see Sites of drug action, left).

All anti-arrhythmic drugs alter the conduction of electrical signals in the heart. However, each drug or drug group has a different effect on the sequence of events controlling the pumping action. Some block the transmission of signals to the heart (beta blockers); some affect the way in which signals are conducted within the heart (digitalis drugs); others affect the response of the heart muscle to the signals received (calcium channel blockers, disopyramide, and procainamide).

How they affect you

These drugs usually prevent symptoms of arrhythmia and may restore a regular heart rhythm. Although they do not prevent all arrhythmias, they usually reduce the frequency and severity of any symptoms.

Unfortunately, as well as suppressing arrhythmias, many of these drugs tend to depress normal heart function, and may produce dizziness on standing up, or increased breathlessness on exertion. Mild nausea and visual disturbances are also fairly frequent. Verapamil can cause constipation, especially when it is prescribed in high doses. Disopyramide may interfere with the parasympathetic nervous system (see p.35), resulting in a number of anticholinergic effects.

TYPES OF ARRHYTHMIA

Atrial fibrillation In this common type of arrhythmia, the atria contract irregularly at such a high rate that the ventricles cannot keep pace. It is treated with digoxin, verapamil, amiodarone, or a beta blocker.

Ventricular tachycardia This condition arises from abnormal electrical activity in the ventricles that causes the ventricles to contract rapidly. Treatment with disopyramide, procainamide, or amiodarone may be effective, although implanted defibrillators are replacing drug treatment for this condition.

Supraventricular tachycardia This condition occurs when extra electrical impulses arise in the pacemaker or atria. These extra impulses stimulate the ventricles to contract rapidly. Attacks may disappear on their own without treatment, but drugs such as adenosine, digoxin, verapamil, or propranolol may be given.

Heart block When impulses are not conducted from the atria to the ventricles, the ventricles start to beat at a slower rate. Some cases of heart block do not require treatment. For more severe heart block accompanied by dizziness and fainting, it is usually necessary to fit the patient with an artificial pacemaker.

Risks and special precautions

These drugs may further disrupt heart rhythm under certain circumstances and therefore they are used only when the likely benefit outweighs the risks.

Amiodarone may accumulate in the tissues over time, and may lead to light-sensitive rashes, changes in thyroid function, and lung problems.

COMMON DRUGS

Beta blockers

(see also p.55)
Sotalol *

Calcium channel blockers

Felodipine *
Verapamil *

Digitalis drugs

(see also p.54)
Digitoxin
Digoxin *

Other drugs

Adenosine
Amiodarone *
Disopyramide
Flecainide
Lidocaine
Mexiletine
Moracizine
Procainamide
Propafenone

* See Part 3