

## **Background to NACRM and overview of therapies**

Cardiac rhythm management (CRM) describes the treatment of abnormal heart rhythms ('arrhythmias'). CRM devices are implanted in patients with abnormal heart rhythms, either too slow or fast, or to improve heart muscle function. They can be categorised as:

### **Pacemaker (PM)**

These CRM devices are used to treat the heart when it beats too slowly either because the heart's own pacemaker (sino-atrial node) is impaired, or the heart's conduction system (atrio-ventricular node) is blocked. PMs consist of a generator (battery) implanted under the skin in the chest with in general 1 or 2 leads that are passed via a vein into the heart to sense and pace the atrium or ventricle. 'Leadless' pacemakers are now available for implantation and consist of a tiny generator that is directly attached to the ventricle to stimulate it. PMs have been shown to improve symptoms due to a slow heart beat, and improve life expectancy in patients with conduction block.

### **Implantable Cardioverter Defibrillator (ICD)**

ICDs detect and treat dangerously fast heart rhythms such as ventricular tachycardia or ventricular fibrillation. Most in addition are able to provide a pacemaker function to treat slow heart rhythms (as for PMs above). There are two main types of ICDs – transvenous ICDs consist of a generator in the chest and lead or leads that are implanted in a similar way to PMs. These devices can terminate a dangerous ventricular arrhythmia by rapid pacing or defibrillation. Subcutaneous ICDs have a generator that is implanted under the skin in the side of the chest, with a lead buried under the skin in the middle of the chest.

ICDs have been shown to improve life expectancy in patients who have already suffered a dangerous heart rhythm (secondary prevention) and in those who are at risk of a dangerous arrhythmia but have not yet experienced it (primary prevention).

### **Cardiac Resynchronisation Therapy (CRT)**

CRT devices pace the main pumping chambers of the heart from two sites, usually with a lead in the right ventricle, and a lead passed via a vein on the outside of the heart to pace the left ventricle. In patients with damaged heart muscle in association with slowed electrical conduction these devices have been shown to improve symptoms of heart failure and reduce mortality. Both PMs and ICDs can incorporate an extra lead to pace the left ventricle (CRT-P and CRT-D, respectively).

### **Implantable Loop Recorder (ILR)**

ILRs are miniaturised ECG recorders that are implanted underneath the skin to record the heart rhythm continuously. These devices are helpful to record arrhythmias occurring intermittently, and monitoring response to treatment.

## **Ablation**

Cardiac ablation is used to treat fast heart rhythms (a form of arrhythmia), originating in the atria or ventricles. Thermal (heat) or cryo (freezing) treatment is delivered to the site of the electrical short circuit or irritable focus via a special catheter usually introduced to the inside of the heart via a vein or artery. Most arrhythmias are not immediately dangerous, and ablation is performed for symptom relief. These arise predominantly from electrically active tissue in the atrium or the junction between atrium and ventricle, with the commonest being atrial fibrillation. Arrhythmias originating from the ventricle are also treated with ablation and may require additional treatment with an Implantable Cardioverter Defibrillator (ICD) to offer protection against the more dangerous forms of ventricular arrhythmia.