

What is a pacemaker?

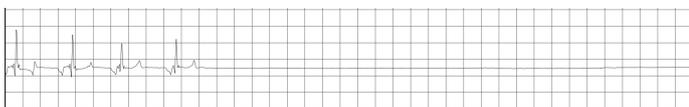
A pacemaker is a device that is implanted under the skin to treat abnormally slow heart rhythms that can cause signs such as fainting.

What is a pacemaker?

A pacemaker consists of a generator (or battery) placed under the skin in the neck and a lead (a wire) running from the generator, into the jugular vein and then attached to the muscle in the right side of the heart. The pacemaker senses the heart's rate and rhythm and, if it is inappropriately slow, the pacemaker delivers a small electrical impulse to the heart muscle that stimulates it to contract.

Why would I need a pacemaker?

A pacemaker is a device used to treat abnormally slow heart rhythms. These abnormally slow heart rhythms can occur in dogs of any age and breed but are more common in terriers, spaniels and Labradors. The slow heart rhythm may arise spontaneously or be caused by inflammation or other structural disease affecting the heart muscle. This ECG trace shows 4 normal beats followed by a 6 second pause.



What are the signs of an abnormally slow heart rate?

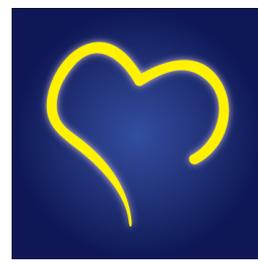
Dogs may show signs of reduced heart output such as lethargy, reduced ability to exercise or intermittent collapse.

What tests might be done to establish if my dog would benefit from a pacemaker?

Echocardiography (ultrasound of the heart) is a safe and painless test that can be performed without any anaesthetic or sedation. In our centre you can stay with your pet to reduce their anxiety whilst this test is performed. Ultrasound allows us to assess heart size, function and assess whether any structural disease is present.

As some abnormal heart rhythms are intermittent, we often place heart monitors (also known as Holter monitors or ambulatory ECGs) onto dogs that they wear at home for 24 hours whilst performing normal activities. At our centre, these recordings are analysed by veterinary cardiologists rather than technicians trained to analyse recordings from human patients. The image below shows a dog wearing a heart monitor which is covered by a protective vest before the dog leaves the clinic.



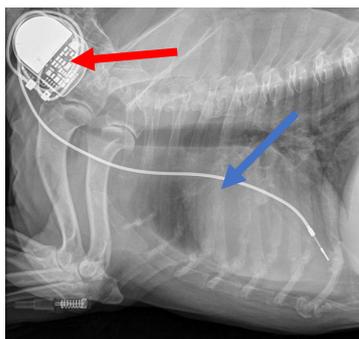


Treatment of slow heart rates

Medical treatment of slow heart rhythms using medications such as terbutaline (“Bricanyl”) or theophylline (“Corvental”) is straightforward and carries a low risk of side effects but these medications are often ineffective at significantly increasing heart rate.

Thankfully implantation of a pacemaker is a very effective means of treating slow heart rates. The device is implanted under general anaesthesia and this does carry a higher risk in cases with slow heart rate. However this risk can be offset by using an experienced anaesthetist and sometimes a temporary pacing device is used to increase heart rate prior to implantation of the permanent pacemaker. Some forms of temporary pacemaker require extensive clipping of hair from the chest.

When placing the permanent pacemaker, the wire is passed down the jugular vein under x-ray guidance and anchored in muscle of the right ventricle of the heart. This wire (blue arrow) is then attached to the generator (red arrow) which is placed under the skin in the neck. The generator measures around 5cm diameter and 5–10mm thick so, when the hair regrows, the device is palpable but not obvious.



What are the possible complications?

Most owners are very pleased with the results of pacemaker placement. However it is important to be aware of potential complications:

1. Device dislodgement – if the wire becomes dislodged the pacemaker will be ineffective. This risk is minimised by strict rest for 4 weeks after implantation, use of a harness instead of a collar and lead and also avoiding jugular blood samples
2. Infection – is thankfully rare but if infection occurs it is likely to spread rapidly around the body necessitating device removal
3. Minor complications such as muscle twitching or fluid swelling at the operative site are uncommon.
4. Pacemaker syndrome – this problem is likely to be related to the pacemaker stimulating the heart to contract in an unnaturally way likely augmented by underlying heart muscle disease. This problem occurs in rarely but results in right heart enlargement and, ultimately signs of heart failure.

What follow up is required?

Post-operative care is provided by your local practice in the 2 weeks following surgery. The pacemaker settings are checked after 4 weeks and then every 6 months thereafter assuming that dogs are asymptomatic.

In the sad event of the dog's eventual death, the pacemaker device needs to be removed prior to the dog being cremated or buried to allow safe disposal of the battery.