

The Electrical Activity of the Heart

A normal heart is composed of four chambers (two atria and two ventricles). Under normal circumstances, the right atrium is the chamber that collects blood from most of the body, and contracts to push this blood into the right ventricle. The right ventricle then pumps this blood into the lungs, where it picks up oxygen from air the animal breathes. Blood from the lungs is then pumped into the left atrium. The left atrium then pumps this blood into the left ventricle, which contracts to send this blood out to the rest of the body. So, how does each chamber of the heart “know” when to contract? A normal heart possesses specialised cells located in the right atrium, in an area called sinus node (SN). These cells are capable of generating an electrical impulse, acting as an efficient built-in pacemaker. The electrical impulse created in the atrium, causing both atria to contract simultaneously. A split second later, this electrical impulse will travel into the ventricles through a system called “atrio-ventricular node”, causing the ventricles to contract simultaneously. When this system is functioning correctly, blood is rhythmically pumped into the lungs and body according to how much oxygen the animal’s body needs from moment to moment.

What should be expected now?

Once the pacemaker has been implanted, owners will be required to:

- 1) Use a harness (instead of a collar) at all times when walking the dog
- 2) NEVER allow a vet to use the right jugular vein to collect blood samples. This could result in serious damage and malfunction of the device.
- 3) After 2 weeks arrange an appointment with your cardiologist for an ECG and stitches to be removed.

Electrical Abnormalities

There are several cardiac conditions that cause abnormalities of the electrical conduction system and require the use of an artificial pacemaker to solve the problem. Amongst these abnormalities, atrio-ventricular blocks, sick sinus syndrome, and atrial standstill represent the most frequent indications for artificial pacemakers in small animal medicine. The placement of an artificial pacemaker will provide an appropriate electrical stimulus to the heart, and insure that essential organs like the brain, lungs and myocardium (the heart muscle) receive enough blood to continue working.

Pacemaker Therapy

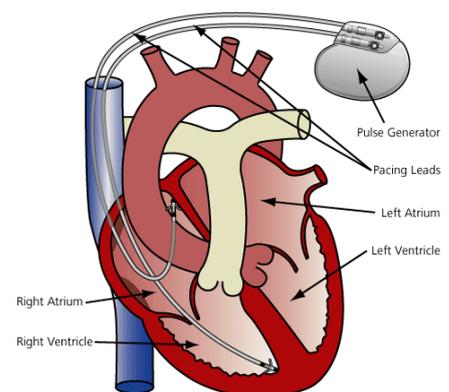
There are two major parts to pacemakers which can be seen in picture below. The first is known as the implantable pulse generator (IPG) and the second is the pacing lead. The IPG is a sophisticated power pack that carries all the necessary electronics for pacing and it is usually positioned at the level of the dog’s neck. The lead is a wire that is placed into the right ventricle and delivers the pulse from the generator to the heart. A dog with an implanted pacemaker can resume a normal

life style. The pacemaker will sense the intrinsic electrical activity of the heart and provide the electrical stimulation only when necessary, allowing a regular and consistent heart rhythm. Although the clinical outcome of pacemaker implant is often excellent, there are occasionally some potential complications that owners should be able to recognise. These include:

Lead dislodgment; this problem usually occurs in the first 7-10 days after implant if the dog is not kept quiet. The pacemaker may not work or work only intermittently and the lead needs to be repositioned surgically.

Infection of the site of the implant; the risk of this complication can be reduced dramatically with the administration of antibiotics and by keeping the surgical site clean and dry with an appropriate bandage.

Seroma at the site of implant; This is characterised by accumulation of fluid as a reaction to the pulse generator. It is a self-limiting condition (3-4 weeks) and does not require any intervention.



- 4) After 4 weeks, and then yearly, contact your cardiologist to arrange an appointment for pacemaker interrogation and setting.
- 5) In the unfortunate event of death: contact your vet or your cardiologist to remove the pulse-generator, which needs to be returned to us for special disposal according to

the current health and safety legislation.

This handout provides a general overview on this topic and may not apply to all patients.

Please do not hesitate to contact us if you require any additional information (www.cardiospecialist.co.uk)

