

## Pacemaker Implantation

### What is a bradyarrhythmia?

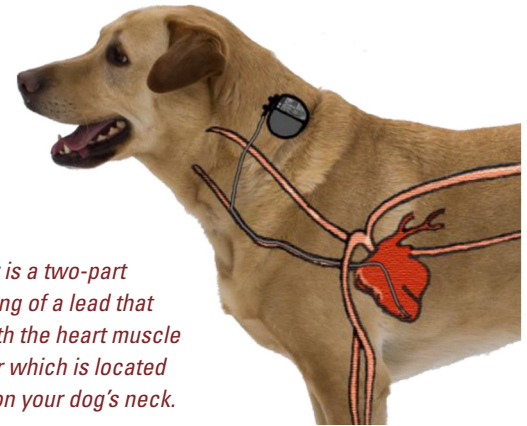
A bradyarrhythmia is an abnormal heart rhythm characterized by very slow heart rates. Bradyarrhythmias may have varied causes including age-related scarring of the conduction system, infection within the heart, diseases of the heart muscle, and structural disease or tumors within the heart. As such, many of the preoperative diagnostics are directed at evaluating for evidence of infection, structural heart disease, and cancer. Regardless of the underlying cause, dogs with severe bradyarrhythmias commonly develop clinical signs of exercise intolerance, fainting, congestive heart failure, and rarely sudden death.

### What is a pacemaker implant procedure?

A pacemaker is a small, two-part device consisting of a lead and generator that uses electrical stimulation to prompt the heart to beat at a more normal rate. Pacemaker implantation is a minimally invasive procedure and is the preferred treatment method for dogs with severe bradyarrhythmias. To perform the procedure, a small incision will be made on your dog's neck and the pacemaker lead will be placed through the jugular vein (a blood vessel in the neck) and into your dog's heart. The generator will be placed under the skin on your dog's neck. Once placed, the pacemaker will be set intraoperatively to control your dog's heart rate. Pacemakers may also be placed in the abdomen; however, this approach is generally reserved for dogs with skin infections or for very small dogs or cats which cannot accommodate a pacemaker in the neck.

### What are the benefits of the procedure?

The goal of a pacemaker implant is to provide your pet with an improved quality and quantity of life. The pacemaker implant will provide your dog with a normal heart rate. While most dogs do not require long-term medications following a pacemaker implantation, dogs with more than one type of arrhythmia or other concurrent illnesses may still require daily medications for the rest of their lives.



*The pacemaker is a two-part system consisting of a lead that is in contact with the heart muscle and a generator which is located under the skin on your dog's neck.*

### What are the risks of the procedure?

While every precaution is taken to avoid complications and to address them readily if they do occur, it is important that you understand the potential for complications.

Pacemaker implants are performed under general anesthesia, which carries risks including airway irritation, drug reactions, and rarely death. Another intraoperative complication which may be associated with the procedure is bleeding (hemorrhage). The bleeding may be mild requiring no treatment, moderate requiring a blood transfusion, or severe which may result in death. Worsening of the arrhythmia may occur while we are positioning the pacemaker implant. Typically, arrhythmias can be corrected with medications. However, severe arrhythmias or those that do not respond to medications may result in death.

Complications which may be associated with the postoperative recovery period include incisional complications such as infection, dehiscence (opening of the incision), and seroma (fluid pocket) formation. More minor incisional complications including mild discomfort or bruising may also be observed. Lead dislodgement is a serious complication resulting in pacemaker malfunction. This most commonly occurs during the first month following the procedure before scar tissue has formed around the lead. However, dislodgement can occur months or even years after the procedure.

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Infection is one of the most serious postoperative complications encountered. Infections throughout the body have the potential to travel to the pacemaker implant and into the heart. Pacemaker implant infections are serious, potentially fatal complications that require immediate attention and usually require a second surgery to replace the pacemaker implant.

Rare complications include the formation of blood clots that can block vessels or travel to the lungs resulting in mild to severe breathing difficulties.

### **What are the alternatives to this procedure?**

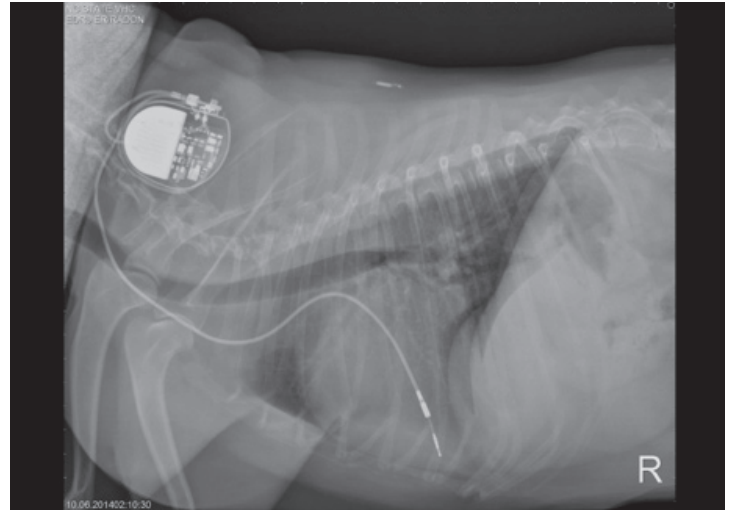
Alternative management includes medical management with daily oral medications. Many dogs do not respond to medical management, and dogs that do may only respond for a short period of time before their clinical signs return. Additionally, as the clinical signs worsen and congestive heart failure develops medical options do not adequately control the symptoms or progressive heart disease.

### **Will I be updated during my dog's hospital stay?**

You will receive twice daily calls from the student working with your dog. Additionally, you will receive a call from the doctor following the procedure when your dog is recovering. It is important that your dog rest following the procedure; therefore, we prefer that you do not visit on the day of the procedure. Most dogs will go home from the hospital the day after their procedure.

### **How do I care for my dog after the procedure?**

Your dog will have two small incisions on the neck which will require twice daily evaluation for signs of infection. To prevent damage of the pacemaker implant, your dog can no longer wear collars and neck leads. Rather, a chest harness or gentle leader system is recommended for the rest of your dog's life. All veterinarians and groomers should be made aware of these restrictions as neck collars or neck leads may damage or dislodge the pacemaker. Strict cage rest with no running, jumping, playing, or swimming is required for the first month following the procedure to prevent lead dislodgement and reduce the likelihood of incisional complications. Most dogs can slowly return to their normal activities following their 1 month recheck.



*Chest X-ray of a dog with a transvenous pacemaker implant.*

It is important that you inform all veterinarians about your dog's pacemaker. Dogs with pacemakers should never have blood drawn from the jugular veins as this may damage the pacemaker lead resulting in pacemaker malfunction. Infection anywhere in the body (i.e. bladder, mouth, skin, etc) must be treated promptly and aggressively. Additionally, antibiotics should also be given prior to any elective surgical and dental procedures to decrease the risk of infection. Finally, your dog should be monitored for signs of pacemaker malfunction which may include weakness, collapse, and lethargy.

### **When will my dog need to be reevaluated?**

If external sutures are placed, they will be removed in two weeks. Suture removal may be performed with your pet's primary care veterinarian. Your pet's pacemaker placement and function should then be reevaluated in 1-3 months with ISU Cardiology. Long term reevaluation is typically every 6 to 12 months. Individual recommendations for reevaluation will be provided when your dog is discharged from the hospital.

### **Further information**

We would be more than happy to discuss any additional questions or concerns regarding this procedure or specific questions regarding your dog. If you have any questions or concerns about the procedure, the after care, or your dog's candidacy you may contact the ISU Cardiology Service at 515-294-4900.