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Cardiac Pacemakers for Pets

Cardiac pacemakers enable many people to lead active lives. Animals are also benefitting from this technology. A number of dogs and cats each year receive a pacemaker, and a few years ago such a device was implanted into a horse at Penn's New Bolton Center, enabling it to compete as a jumper once again.

Here at VHUP five to six pacemakers are implanted annually into dogs and cats. "A few of the pacemakers are willed to us, others are received from pathologists who have recovered them from human patients at autopsy with permission of the family," said Dr. Malcolm MacDonald. "Frequently families are not aware that a pacemaker can be re-used in a pet or a human patient in the Third World. The devices often have six to eight years of battery life left and it seems a shame to not re-use them. Once families are told that the pacemaker can be used to help others, they give permission to have it removed and donated." The program to send used pacemakers either to veterinary schools or to Third World countries is organized by a group of pathologists.

Pacemakers are small, about the size of a cigarette lighter, with a battery life of about twelve years. Once the battery runs down, the device must be replaced. Most pacemakers are set at a specific pacing rate which never changes. More sophisticated models increase the number of beats as the patient's activity increases. The shorter battery life of recycled pacemakers implanted in animals is rarely a problem since their life-spans are relatively short compared to that of a human being.

Pacemakers are not a panacea for all heart problems. They can only help if the patient has certain heart rhythm problems due to disease of the pacing area or conduction system of the heart. These areas regulate the electric stimuli causing contractions of the heart muscle and the subsequent pumping action. Diseases or other abnormalities of the electrical conducting system can cause heart block. The patient develops irregular heart rhythm and may faint. One particular condition occurs in people and animals, and is seen quite often in miniature schnauzers (sick sinus syndrome).

"Our patients are primarily middle-aged and elderly dogs," said Dr. MacDonald. "To be a candidate for the pacemaker, the animal has to be in reasonably good health with no other serious health problems. Usually a pacemaker allows a dog a normal life for a number of years before age-related other disorders set in."

The implantation surgery is fairly routine and can

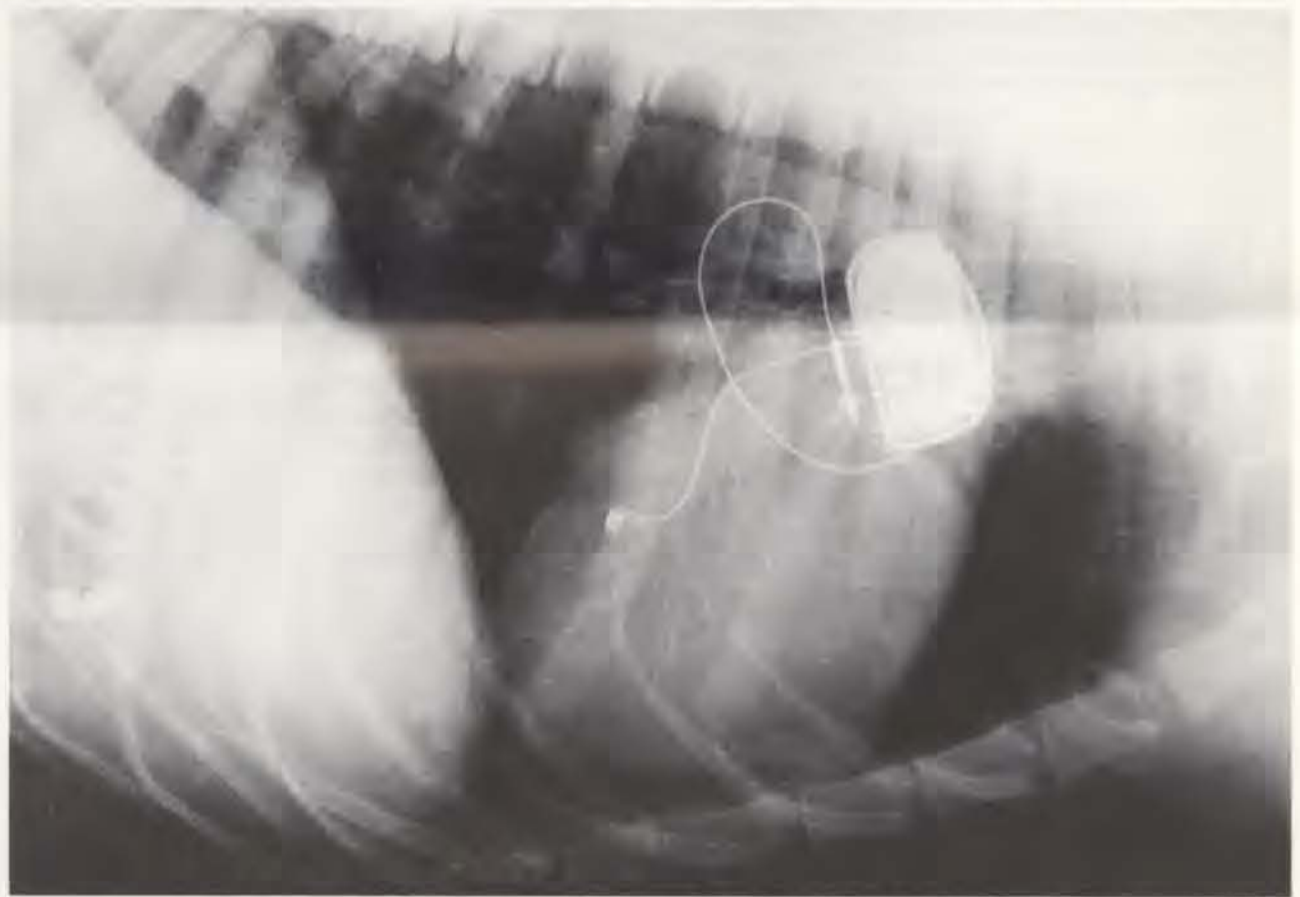
be done as chest surgery or through a vein. The preferred technique in dogs is to attach the electrode directly to the outside of the heart and place the pulse generator in the abdomen or subcutaneously (under the skin). In small dogs the heart can be reached through the diaphragm, while in large dogs the heart is reached through the thoracic (chest) wall. Another technique is to thread the electrode catheter through a vein and implant it into the right ventricle. The pulse generator is implanted subcutaneously and connected to the electrode which transmits the electric impulses to the heart muscle. In either case, the pacemaker is securely fastened. Secure fastening is important as pacemakers can become detached and then migrate, potentially resulting in pacemaker failure. In man, where body motion can be more controlled, transvenous approach is more often used.

For dogs the pace is set at approximately 100 beats a minute. "The normal heart rate of most dogs varies with size, 60 to 160 beats per minute," said Dr.

MacDonald. "In bigger dogs the heart rate is toward the lower end, while the hearts of smaller dogs beat faster. The figure of 100 was arrived at to permit the animal some activity. Dr. Buchanan, professor of cardiology at the School, chose it when he successfully implanted the first pacemaker into a clinical canine patient in the 1967. That dog, a Basenji, required a second pacemaker because the battery ran low after the first five years."

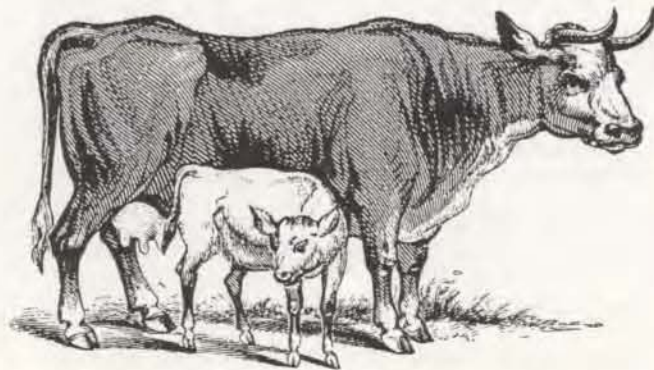
Dr. MacDonald explained that, while expensive, implanting a pacemaker into a canine or feline patient is a realistic approach. "It allows the animal to live a longer normal life. It is also rewarding to the veterinarian as the improvement of the patient is dramatic." At this point pacemaker implants are performed mostly at veterinary schools and a few specialized practices. The majority of patients are dogs as pacing area disorders are rare in cats.

Dr. MacDonald, a veterinarian from England, is completing his residency in cardiology at VHUP.



Veterinary Medicine on TV

"The Gentle Doctor", a series of 13 half-hour programs, depicting all aspects of veterinary medicine, is coming to local PBS stations. The show was produced in Florida. A number of Penn faculty and staff were interviewed for the series. Look for them in the following segments: Women in Veterinary Medicine, Avian Medicine, Veterinary Ophthalmology, Animals In Laboratory Research, Aquatic Mammal Medicine, and Animal Behavior. Call your local PBS station to find out when the series will be shown in your area.



New Dairy Facility

Ground will be broken soon for the Mark W. Allam Center for Dairy Cattle Research and Teaching. The Center will serve as a modern and sophisticated environment for veterinary and graduate students interested in the medical and managerial aspects of dairying; a regional resource for the dairy industry; and a laboratory for veterinary medical researchers in fields such as epidemiology and preventive medicine, nutrition, reproduction, infectious and chronic diseases, and dairy cattle economics. Funds for the building at New Bolton Center are being provided through gifts from individuals and corporations as well as through appropriations from the Commonwealth of Pennsylvania.