HEARTZINE.com

Pacemaker Information

Ahmed Bilal

Pacemakers are battery-powered devices that function to electri Pacemakers are battery-powered devices that function to electrically stimulate the heart to contract and thus to pump blood throughout the body. It consists of two parts the generator and the leads. The generators weigh less than 30 grams and the battery can last anywhere from 7-8 years on average and is replaced when necessary. Pacemakers are usually implanted in patients in whom the heart's own "spark plug" or electrical system is no longer functioning normally.

The sinoatrial (SA) node, located in the right atrium, is the hearts normal spark plug which generates an electrical impulse that signals the left and right atria to contract and pump blood into the ventricles. The impulse then travels down into another small patch of specialized heart tissue called the atrioventicular node (AV) node, located between the atria and ventricles. The AV node conducts the electrical impulse to the ventricles which then contract and pump blood out into the lungs and throughout the body. This sequence of events occurs each time the heart beats, usually about 60-80 times per minute. Two problems can result in the need of pacemaker implantation:

Bradycardia

Tachycardia

Bradycardia is a heart condition that causes the heart to beat too slowly. The SA node may generate only 30-40 impulses per minute leading to a low heart rate. The AV node may also malfunction by not stimulating the ventricles to contract and pump blood frequently throughout the body. Consequent inadequate blood flow throughout the body may lead to sensations of dizziness or lightheadedness. The impulses can also be completely blocked which can lead to a heart block.

Pacemakers are also used to terminate an abnormally rapid heart rate called tachycardia. The pacemaker can sense the abnormally fast heart rate and take control of it by speeding up first. Then, it can be slowed down to normal.

The pacemaker and leads can be programmed in various and often complex ways to analyze the heartbeat and then to decide if the pacemaker should electrically stimulate the heart to contract. Generally, the electrical leads that are implanted in the right atrium and/or right ventricle can perform two functions. They can serve as sensors, detecting if electrical impulses generated by the SA node have occurred and if such electrical impulses have been conducted by the AV node down into the ventricle. These same electrical leads can also be used to transmit an electrical impulse from the pacemaker's battery down into the right atrium and/or right ventricle. If the lead implanted into the right atrium does not detect that the SA node has fired and created an electrical impulse, the pacemaker itself will send an electrical impulse to the right atrium, taking over the function of being the heart's "spark plug." If the lead implanted into the right ventricle does not detect that an electrical impulse has made it through the AV node down into the ventricle, the pacemaker will generate an electrical impulse that is conducted via the electrical lead in the right ventricle to the ventricles. In this manner, the pacemaker can supervise the heart and ensure that it continues to contract at a heart rate adequate to pump sufficient blood throughout the body.

Certain devices and equipments can interfere with the pulse generating ability of the pacemaker. Home appliances on an average have a remote potential of causing interference. However, power-generating equipment, arc welding equipment or any electromagnetic noise may interfere with the pacemaker function and even change the way it has been programmed to operate. Currently, cellular phones do not cause damage to the pacemaker but it has been advised to keep them at least six inches away from the heart. Certain medical equipment or procedures

can also affect the working of a pacemaker. Magnetic resonance imaging (MRI) and microwave diathermy are procedures which have been known to severely damage the pulse generator. Hence, a doctors advice should always be sought before any medical examination or treatment.