

# The Artificial Pacemaker

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The heart's natural pacemaker is the sinoatrial (SA) node, which is located at the top entrance of the right atrium. The heart beats when electrical impulses are released by the SA node, causing the atria to contract. The signal then travels to the atrioventricular (AV) node which sends it to the ventricles, causing them to contract.

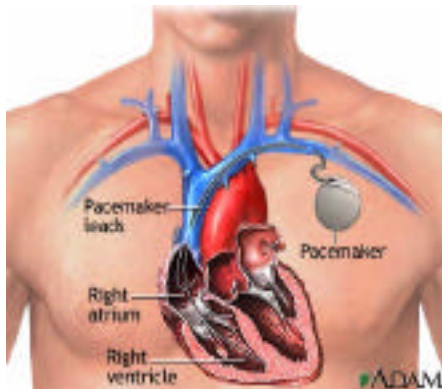
There are two main reasons for an irregular heart rhythm:

1. The SA node may not work properly and not send signals frequently enough, causing less contractions and a slow heart rhythm.
2. The heart's electrical pathways may be blocked, stopping the current from reaching the necessary muscles.

The artificial pacemaker is a small, battery-operated device that alters the heart rate to a regular rhythm. It does this by sending electrical impulses to the heart. It can be used to pace the heart's atria, ventricles, or both depending on patient's need. It is programmable to be set to fit the needs of the patient. It senses when heart rate is too high and shuts off and when it becomes too low again and turns back on. It is about 3" x 2" in size and less than half an inch thick and often weighs less than 30 ounces. The average battery life is 7-8 years.

Made up of two main parts:

1. Pulse Generator – Includes battery and several electronic circuits.
2. Leads – Wires that attach to the heart wall. They are attached to the generator and pass through the large vein into the heart, where they are placed in the atrium and/or ventricle.



Two types of pacemakers are:

## 1. Single Lead Pacemakers

Used when the only problem is the production of the initial impulse in the atrium, when the ventricle is going too slow, or when slow heart rate only occurs occasionally and for brief periods of time.

There is also a single lead that can sense both the atrium and ventricle, but only paces in the ventricle.

2. “Dual Chamber” Pacemakers keep the atria and ventricles contracting in their proper sequence.

A small incision is made in the chest forming a pocket under the skin above the muscle. The leads are inserted into a vein following it through the large veins that enter the heart. The leads are put in place by using an x-ray tube and are then inserted into the pulse generator. The generator is placed in the pocket and is secured to the muscle with a suture. This whole procedure takes about 30-60 minutes to complete.

The total cost of pacemakers is usually around \$10,000 - \$15,000 including the device, insertion, and physician fees.

After insertion, costs are minimal for periodic check-ups on the battery and leads. In most cases, pacemakers are covered by insurance.

## References

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