




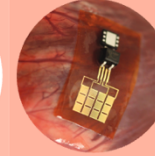


# Keeping the Pace: The Science of Pacemakers and Defibrillators

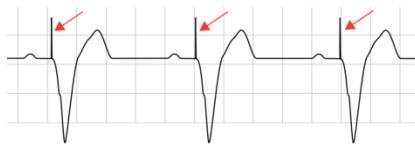
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## History of Pacemakers (1950s-Current):

Paradigm Shifts in Cardiac Pacemakers					
<p><b>1950s</b> AC-powered pacemakers tethered to an extension cord (Furman)</p> 	<p><b>1950s</b> Battery-powered transistorized "wearable" pacemakers (Lillehei/Bakken)</p> 	<p><b>1958</b> First fully implantable pacemaker (Elmqvist/Senning)</p> 	<p><b>2015</b> Implantable pacemaker—basic system had not evolved significantly</p> 	<p><b>2016</b> Leadless pacemaker—the entire device is placed within cardiac chambers</p> 	<p><b>Future</b> Batteryless devices, which harvest cardiac motion to power pacing circuits</p> 

Mulpuru, S.K. et al. J Am Coll Cardiol. 2017;69(2):189-210.



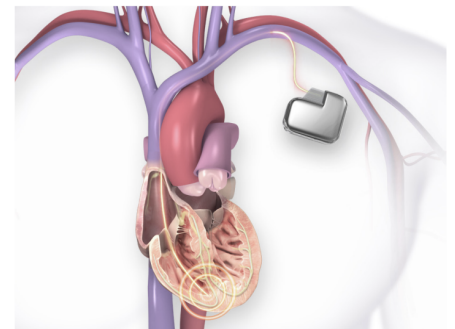
### What Is a Pacemaker?

A pacemaker is a small device that sends electrical impulses to your heart to help control your heartbeat so your body gets blood and oxygen.

Traditional pacemakers have three parts:

- Generator
- Wires (leads)
- Sensors

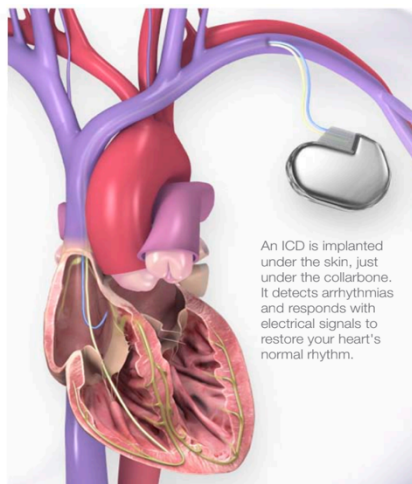
Some newer kinds are wireless.



A traditional pacemaker is implanted under the skin, just under the collarbone.

### What Is an Implantable Cardioverter-Defibrillator (ICD)?

An ICD is a battery-powered device placed under the skin that keeps track of your heart rate. Two thin wires connect the ICD to one or more of the chambers in your heart. The heart sends electric signals to the ICD. The ICD can deliver an electric pulse or shock to help restore a normal heartbeat to your heart if it is beating chaotically and much too fast. Cardiac defibrillation is a way to return an abnormally fast or disorganized heartbeat to normal with an electric shock.



An ICD is implanted under the skin, just under the collarbone. It detects arrhythmias and responds with electrical signals to restore your heart's normal rhythm.

