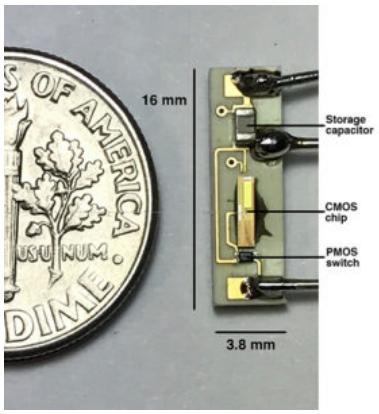
June 27, 2017

Battery-free pacemaker successfully powers the heart

June 12, 2017 By Danielle Kirsh Leave a Comment



The internal components of a battery-less pacemaker introduced this week by Rice University and the Texas Heart Institute. The pacemaker can be inserted into the heart and powered by a battery pack outside the body, eliminating the need for wire leads and surgeries to occasionally replace the battery. *[Image from Rice Integrated Systems and Circuits/Rice University]*

A wireless, battery-free pacemaker has shown success in powering the heart in pig models, according to researchers from Rice University and the Texas Heart Institute.

The pacemaker, designed by lead researcher Aydin Babakhani, gets its energy wirelessly from radio frequency radiation transmitted from an external battery pack a few centimeters away.

Pacemakers are small battery-powered devices that assist the heart with regular rhythm heartbeats by creating electrical impulses to stimulate the heart to beat, according to the American Heart Association. A sensing mode on the pacemakers allows for it to send impulses when the heartbeat is above a certain level and fires when the heartbeat is too slow. All of these signals are sent to the heart through wires called leads.

The problem with battery-powered pacemakers is that the battery needs to be replaced eventually, and even that requires surgery. Surgery to replace batteries can sometimes be risky, and complications with leads can cause unnecessary bleeding and infections.

There are are lead-less pacemakers on the market, such as the Micra from Medtronic, an improvement on previous models. The University of California at Los Angeles and the University of Connecticut were even even working on a battery-free solution for pacemakers that harvested energy from inside the body.

The research out of Texas could be a next step.

"This technology brings into sharp focus the remarkable possibility of achieving the 'Triple Crown' of treatment of both the most common and most lethal cardiac arrhythmias: external powering, wireless pacing and — far and away most importantly — cardiac defibrillation that is not only painless but is actually imperceptible to the patient," said Mehdi Razavi, director of clinical arrhythmia research and innovation at THI and an associate professor at Baylor College of Medicine, in a press release.

Battery-free pacemakers couldn't come soon enough. Pacemaker implants are on the rise, with 2.9 million patients receiving a pacemaker between 1993 and 2009, according to a 2012 study.

The implantable chip is less than 4 mm wide and uses a receiving antenna, an AC-to-DC rectifier, a power management unit and a pacing activation signal. The circuit board, smaller than a dime, also has a capacitor and switch. Microwaves are transmitted to the switch to power it in the 8-10 gHz of electromagnetic frequency spectrum.

The pacing signals frequency on the pacemaker can be adjusted by increasing and decreasing power to the antenna. The antenna stores the power until it reaches a certain threshold. Once it reaches the threshold, the electrical charge is released and begins to fill again.

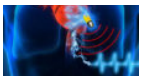
A pig's heart rate was turned from 100 to 172 beats per minute using the chip.

[Want to stay more on top of MDO content? Subscribe to our weekly e-newsletter.]

You may also like:



Researchers find 8k cyber vulnerabilities in pacemakers



This could be the battery-free solution for pacemakers

9 cardiology breakthroughs you need to know

Filed Under: Applications, Cardiovascular, Research & Development, Slider Tagged With: cardiology, medtech, pacemakers, Rice University, Unviersity of COnnecticut

Speak Your Mind

Name *

Email *

Website

POST COMMENT

Medical Design & Ou...

Follow +1

+ 74

MassDevice

The Medical Device Business Journal. MassDevice is the leading medical device news business journal telling the stories of the devices that save lives.

Visit Website

DeviceTalks

DeviceTalks is a conversation among medical technology leaders. It's events, podcasts, webinars and one-on-one exchanges of ideas & insights.

Visit Website

Subscribe Today

Medical Design & Outsourcing covers the technical advancements in the design, development, and contract manufacturing of medical devices and equipment.

Subscribe Today

Medical Design & Outsourcing

- Advertising
- Contact Us
- Enews Sign Up
- Subscribe to Medical Design and Outsourcing Magazine