

## **MEDICAL BREAKTHROUGHS** **RESEARCH SUMMARY**

TOPIC: ANTIBIOTIC ENVELOPE STOPS HEART INFECTIONS

REPORT: **MB #4768**

**BACKGROUND:** An estimated 1.25 million permanent pacemakers are implanted globally each year and about 100,000 defibrillators are inserted in the U.S. each year. Arrhythmia is any disorder of your heart rate or rhythm and it means your heart beats too quickly, too slowly, or with an irregular pattern. If the arrhythmia is serious, you may need a cardiac pacemaker or an implantable cardioverter defibrillator (ICD). They are devices that are implanted in your chest or abdomen. A pacemaker helps control abnormal heart rhythms. It uses electrical pulses to prompt the heart to beat at a normal rate. It can speed up a slow heart rhythm, control a fast heart rhythm, and coordinate the chambers of the heart. An ICD monitors heart rhythm. If it senses a dangerous rhythm, it delivers shocks. This treatment is called defibrillation. An ICD can help control life-threatening arrhythmias, especially those that can cause sudden cardiac arrest. Most new ICDs can act as both a pacemaker and a defibrillator. Many also record the heart's electrical patterns when there is an abnormal heartbeat which helps the doctor plan future treatment.

(Sources: <https://medlineplus.gov/pacemakersandimplantabledefibrillators.html>, [https://www.mpo-mag.com/contents/view\\_online-exclusives/2020-02-21/examining-the-state-of-the-pacemaker-industry/](https://www.mpo-mag.com/contents/view_online-exclusives/2020-02-21/examining-the-state-of-the-pacemaker-industry/), <https://www.nytimes.com/2011/01/05/health/05device.html>)

**HEART DEVICE INFECTIONS:** Pacemaker and defibrillator pocket infections are a major complication after implantation. During implantation, there is a risk of device contamination with the patient's own skin flora and it can be prevented by ideal surgical asepsis technique, pre and perioperative use of antibiotics. Most pacemaker infections occur after surgery. The infection rate is slightly higher for replacements. Most infections start in one of two places: either at the incision site or where the leads connect to the heart. Pacemaker-related infections are a special type of bacterial infection, called endocarditis. It's the same life-threatening infection that affects the lining of your heart valves. These infections aren't immediately lethal. Over time, however, the infection attacks your heart valves and can spread to your lungs and brain via the bloodstream. If it isn't treated, it is sometimes fatal. The only treatment option is removal and replacement surgery. Your doctor will remove all the leads and any infected tissue. He or she will carefully remove any part of the device that has adhered to the heart tissue or veins to avoid tearing. The physician will implant a new device in a different location (such as in the opposite shoulder) and will prescribe a regimen of antibiotics.

(Sources: <https://health.clevelandclinic.org/hidden-pacemaker-infection-making-sick/>)

**NEW TECHNOLOGY:** Khaldoun Tarakji, MD, Associate Section Head of Cardiac Electrophysiology at the Cleveland Clinic developed the antibiotic envelope for cardiac device implant surgery. The envelope is constructed of a multi-filament mesh that's fully absorbable, and it has absorbable polymers that are mixed with 2 antibiotics: rifampin and minocycline. The envelope wraps the pacemaker or defibrillator before it's implanted in the pocket. Then, the antibiotics get eluded in the pocket over a course of seven days. The envelope is fully absorbed within 9 weeks. It's been shown to reduce the risk of major device-related infection by 40% within 1 year with no increase in complications.

(Source: <https://www.mdmag.com/conference-coverage/acc-2019/khaldoun-tarakji-md-mph-wrapit-results>)

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