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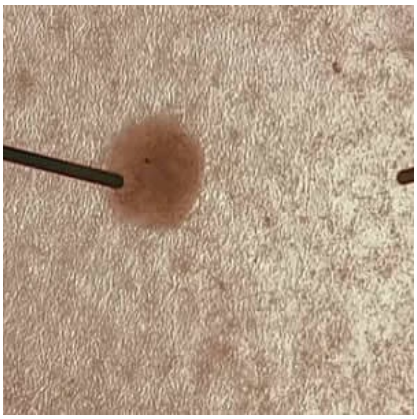
Functional Heart Pacemaker Cells Developed



In a first, scientists have produced functional pacemaker cells from human stem cells, paving the way for alternate, biological pacemaker therapy. The researchers from the McEwen Centre for Regenerative Medicine, University Health Network, used a developmental-biology approach to establish a specific protocol for generating the pacemaker cells. Their work is reported in the journal Nature Biotechnology.

See Also: Pacemaker Checks Help Prevent Stroke

The findings show how human pluripotent stem cells can be coaxed in 21 days to develop into pacemaker cells, which regulate heart beats with electrical impulses. Tests were conducted in rat hearts where these pacemaker cells successfully activated the electrical impulses that trigger the contraction of the heart.

"What we are doing is human biology in a petri dish," explains Dr. Gordon Keller, Director of the McEwen Centre, the senior author, and a trailblazer in generating a wide variety of specialised cells from human stem cells. "We are replicating nature's way of making the pacemaker cell."

Sinoatrial node pacemaker cells are the heart's primary pacemaker, controlling the heartbeat throughout life. Defects in the pacemaker can lead to heart rhythm disorders that are commonly treated by implantation of electronic pacemaker devices. Biological pacemakers represent a promising alternative to electronic pacemakers, overcoming such drawbacks as a lack of hormonal responsiveness and the inability to adapt to changes in heart size in paediatric patients.

The McEwen Centre scientists noted that human clinical trials to test such biological pacemakers are from five to 10 years away, and that the next step is to launch safety and reliability pre-clinical trials on the pacemaker cells.

Still, researchers can use their new technology to produce pacemaker cells from patients suffering from pacemaker dysfunction. They can then use these patient-specific cells to study the "disease in a (petri) dish" and to identify new drugs that will improve their pacemaker function.

Long term, the research team hopes to develop a biological pacemaker to transplant into patients who need an electronic one. These electronic pacemakers can last anywhere from five to 10 years or more – on the average about seven years. If successful, the biological pacemaker holds the promise of a lifelong cure.

Source: University Health Network

Image Credit: University Health Network

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