

ENGINEERED BIOLOGICAL PACEMAKERS

SUMMARY

The National Institute on Aging's Cellular Biophysics Section is seeking statements of capability or interest from parties interested in collaborative research to further develop, evaluate, or commercialize biological pacemakers.

REFERENCE NUMBER

E-134-2009

PRODUCT TYPE

- Devices

KEYWORDS

- Biological Pacemaker

COLLABORATION OPPORTUNITY

This invention is available for licensing and co-development.

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DESCRIPTION OF TECHNOLOGY

The National Institute on Aging's Cellular Biophysics Section is seeking statements of capability or interest from parties interested in collaborative research to further develop, evaluate, or commercialize biological pacemakers.

A common symptom of many heart diseases is an abnormal heart rhythm or arrhythmia. While effectively improving the lives of many patients, implantable pacemakers have significant limitations such as limited power sources, risk of infections, potential for interference from other devices, and absence of autonomic rate modulation.

The technology consists of biological pacemakers engineered to generate normal heart rhythm. The biological pacemakers include cardiac cells or cardiac-like cells derived from embryonic stem cells or mesenchymal stem cells. The biological pacemakers naturally integrate into the heart. Their generation of rhythmic electric impulses involves coupling factors, such as cAMP-dependent PKA and Ca²⁺-dependent CaMK II, which are regulatory proteins capable of modulating/enhancing interactions (i.e.

coupling) of the sarcoplasmic reticulum-based, intracellular Ca²⁺ clock and the surface membrane voltage clock, thereby converting irregularly or rarely spontaneously active cells into pacemakers generating rhythmic excitations.

Development Status:

Early stage.

POTENTIAL COMMERCIAL APPLICATIONS

This technology can be utilized in heart disease characterized by arrhythmia or situations requiring an implantable cardiac pacemaker.

COMPETITIVE ADVANTAGES

In contrast to current implantable cardiac pacemaker technology, this technology is not externally powered, has a lower risk of infection, has decreased potential for interference from other devices, and has full autonomic rate modulation.

PATENT STATUS

- **U.S. Filed:** [U.S. Provisional Application No. 61/180,491 filed 22 May 2009](#)

THERAPEUTIC AREA

- Cardiovascular Systems
- Central Nervous System, Mental and Behavioral, Pain