Biologic Pacemaker

**Background:** There are about 3 million people worldwide with pacemakers, and each year 600,000 new pacemakers are implanted to treat various indications including symptomatic sinus bradycardia, tachycardia-bradycardia syndrome, and sinus node dysfunction. Despite their success, artificial pacemakers may suffer from electrode fracture, damage to insulation, can induce infection and venous thrombosis, and may require re-operations for battery exchange. To avoid these drawbacks researchers at Washington University in St. Louis are developing compositions and methods to obtain a biological pacemaker with permanent pacemaker activity by reprogramming cardiac tissue into pacemaker-like cells.

**Technology Description:** The team led by Dr. Rentschler uses specialized adenoviral vectors with enhanced infectivity delivery of gene regulatory factors to reprogram heart muscle cells into pacemaker-like cells while avoiding a host immune response. The concept has been successfully demonstrated in mini-pigs and in human heart tissue slice assays. Method optimization is taking place for use in humans to, amongst other diseases, treat sinus node dysfunction. The controlled localized reprogramming of muscle cells prevents systemic side effects as well as adverse effects to nearby tissue. This invention has the potential to outperform electronic pacemakers and has, considering the large market, significant commercial value.

**Key Advantages:**
- Conversion of patient’s own heart cells into pacemaker-like cells
- Localized administration prevents nearby tissue and systemic side effects
- None of the drawbacks typically associated with electronic pacemakers
- Animal and human tissue data
- Large and growing market

**Patents:** Application [WO2016141073A1](#): Induction of pacemaker-like cells from cardiomyocytes.


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