Method to Provide Discriminating Shock Therapy to the Heart

ID 719

Background
In the US, about 26,000 people have an implantable cardiac defibrillator (ICD) inserted each year. This device provides life saving shocks to the heart if it starts inappropriately beating. However, not all rhythm changes are dangerous; traditional ICDs are unable to discriminate between life threatening and benign changes and will shock the heart during both states. These shocks are not only extremely painful to the patient; but they also drain the battery of the internally implanted device. Surgery is necessary to replace the battery every 4 to 6 years and these unnecessary shocks reduce that battery lifetime creating increased healthcare costs and patient duress due to that replacement procedure.

Technology Description
Investigators have discovered a new method of determining if a patient is experiencing a life threatening ventricular arrhythmia (VA) or a supraventricular tachycardia (SVT). This method is a totally new approach to differentiating between SVT and VA based on the response of the abnormal rhythm to anti-tachycardia pacing (ATP) and increases the chances of terminating the abnormal rhythm regardless of its origin. This new method utilizes a simple concept: if the atria and ventricles are synchronized by simultaneous ATP but the tachycardia is not terminated, the chamber from which the tachycardia originated would be the first to witness an electrical event after ATP. The heart would only be shocked then if a patient was experiencing the life-threatening VA.

Applications
• For use in patients with implanted cardiac defibrillators (ICDs)

Advantages
• Reduces or avoids all inappropriate electro-shocks increasing the physical and emotional state of the patient
• Provides lifesaving shock only when a patient is in danger
• Detects the origin of the cardiac arrhythmia
• Terminates the abnormal rhythm regardless of its origin
• Prolongs battery life and decreases the cost of health care by reducing the need for more frequent surgeries to change the battery
• Can be incorporated into currently existing ICDs.
• Shown safe in human trials

Stage of Development
• This method has been tested in humans

US Patent 7,206,633
US Patent Application 20060217769
EP1569716

Related Technologies
ID 906
Automated Assessment of Atrioventricular and Ventriculoatrial Cardiac Conduction by a New Dual-Chamber Cardioverter Defibrillator as a Novel Method of Discriminating Between Ventricular and Supraventricular Tachyarrhythmias
US Patent Application 20090143832

ID 1541
Standard Surface Electrocardiogram (EKG) Reconstruction from Implanted Device Electrograms (EGM)
US Patent Application 20090187097

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Research Interests

- Mouse Models of Cardiac
- Electrophysiologic Diseases
- Rabbit Model of Pacing and MI
- Mechanisms of Benefit from BIV Pacing
- Novel Algorithms of VT/SVT discrimination
- Signal Processing of EGM from devices

Select Publications


6. Tanaka H. et al., Comparative mechanical activation mapping of RV pacing to LBBB by 2D and 3D speckle tracking and association with response to resynchronization therapy. JACC Cardiovasc Imaging. 2010 May;3(5):461-71.

7. Mendenhall GS et al., 12-lead surface electrocardiogram reconstruction from implanted device electrograms. Europace. 2010 Apr 21


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