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Improved Impedance Measurements for Pulmonary Edema from Pacemaker or CRT-ICD Leads

Improved Monitoring of Heart Failure Using Bioimpedance

Technology No. z08220

IP Status: Issued US Patent; **Application #:** 13/122,664

Bioimpedance and Pulmonary Edema in Heart Failure Patients

One of the major problems facing patients with heart failure is pulmonary edema. It is now possible to monitor the extent of pulmonary edema by measuring impedance from the leads of a cardiac pacemaker, a cardiac resynchronization therapy device (CRT-D) or an implantable cardioverter defibrillator (ICD). By taking advantage of the body's natural electrophysiology, decreases in the impedance between the leads and devices indicate increases in fluid buildup in the lungs. By calibrating this impedance, doctors can receive real-time information about the level of pulmonary edema in a patient, thus alerting them to worsening heart failure.

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Improving Impedance Measurements from Cardiac Pacemaker Leads

There are currently several technologies that measure this impedance, but researchers at the University of Minnesota have developed a method to increase the sensitivity of measuring impedance by three to four times. This improvement involves adding two voltage pick up electrodes along the leads running to the superior vena cava and right ventricle. This is convenient because the invention takes advantage of the leads which are placed in an optimal location to measure pulmonary edema with high sensitivity. Because the electrodes can be placed along a single lead in the right ventricle, bioimpedance measurement capabilities can be coupled with a wider variety of devices, not just CRT-D or ICD pacing systems.

BENEFITS OF VOLTAGE PICK UPS ALONG PACEMAKER LEADS FOR MEASURING PULMONARY EDEMA:

- Increases sensitivity of measuring bioimpedance three to four times
- Measuring impedance allows doctors to assess the extent of pulmonary edema from preplaced pacemaker, CRT-D or ICD leads in heart failure patients
- Alerts physician to worsening heart failure

Phase of Development Results have been obtained from a detailed electrical model of the thorax used for several other patents.

Researchers: Robert P Patterson, PhD Emeritus Professor, Department of Physical Medicine and Rehabilitation

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