Chronic wounds, such as ischemic wounds and pressure ulcers, are a leading cause of lengthy and repeated hospitalization for many veterans with disabilities. They are also among the most common causes of morbidity in the patient populations cared for by the VA. Electrical stimulation is a recommended treatment modality for severe chronic wounds, but its underlying physiological mechanisms are not fully understood. This has prevented the development of optimal treatments and limited its widespread clinical application.

We are developing a new electrotherapy delivery system, the Modular Stimulation System, that simplifies administration of stimulation and allows the systematic evaluation of its effects and will provide a basis for effective translation to the clinic.

The technology consists of a disposable single channel stimulator integrated into a flexible polymer carrier that can be affixed directly to the skin. The design combines advanced materials, microfabrication techniques and a simple, user-friendly communication interface to result in a novel medical device that should cost less than $100 to produce. The stimulation and control module is incorporated into a sterile occlusive dressing to conveniently and reliably deliver electrical currents without the inconvenience of wires that are prone to failure and could provide a path for bacteria to contaminate open wounds. Each device is suitable for up to one week of continuous use, after which the electric bandage can be easily replaced with another device individualized to optimize treatment to the current status of the healing wound. This simple, reliable, low-cost intervention can be used in a variety of settings, from the intensive care unit to the home and community environments.

**APT Center Contributions:**
- Application specific integrated circuit design and fabrication
- Design controls and documentation within a quality system to facilitate future commercialization
- Assistance with intellectual property protection
- Project start-up and bridge funding
- Access to microfabrication and polymer processing facilities
Project Funding History:
Steris Corp/University Hospitals. Infectious Diseases Research Support, 2012 – 2013
US Department of Veterans Affairs, Merit Review F7129R, 2010-2013
2004 Presidential Research Initiative Grant, 2004 – 2005

Selected Publications:


The APT CENTER is a Department of Veterans Affairs Rehabilitation R&D Center of Excellence that creates novel, cross-cutting technologies for the diagnosis, treatment or study of high priority clinical conditions within a structured framework that facilitates regulatory compliance, dissemination within the rehabilitation community and commercialization by outside manufacturers. Center projects focus on the following: prosthetics and orthotics, health maintenance, neural interface and enabling technologies. The Center has over 30 investigators, engineering and clinical staff, and support services including regulatory affairs, quality systems, project management and grants administration.