SERVICING ELECTROCEUTICALS

OCTOBER 2018 TECH BRIEF FOR HEALTH CARE TALENT NETWORK

Bionic Men and Women

Bioelectric medicine is considered an emerging field, even though some electroceutical devices such as the artificial pacemaker, muscle stimulation for pain relief and hearing aids are mature technologies. Bioelectric procedures and prosthetics utilize electrical impulses to control the body's neural circuits. In many cases, the intention is to avoid or to replace drug-based interventions.

In July, a market research study on global electroceuticals/bioelectric medicine was published by *Million In$ights*. It sizes the market at **$35.5 billion by 2025**. Growth factors include high-tech advancements, increase in disposable income, increasing incidences of hearing loss, rising prevalence of neurological disorders and an aging population. On the other hand, the report indicates there are also factors that will hamper market growth, like the dearth of trained professionals.

The study includes these **electroceutical devices**: Deep Brain Stimulators, Transcutaneous Electrical Nerve Stimulators, Vagus-Nerve Stimulators, Cardiac Pacemakers, Spinal Cord Stimulators, Sacral-Nerve Stimulators, Cochlear Implants, Retinal Implants, and Implantable Cardioverter Defibrillators (high-end pacemakers). In 2016, pacemakers held the largest market share. Going forward, eyesight restoration via retinal implants are anticipated to grow at the fastest rate.

The prominent players identified in this study overlaps with those **identified by a competitor**, *Market Watch*, covered in this month's LSTN Tech Brief. *Million In$ights* adds Cefaly Technology, EnteroMedics Inc., NeuroSigma Inc., BioElectronics Corp, MED-EL, and Oticon Medical to the list.

Labor Force Takeaway

Market research predicts that training in electroceutical use **could be *the* factor controlling the rate of growth** of the electroceuticals market. NJ has the unique opportunity to corner the market on clinical electroceutical expertise. Don't worry about geography – telemedicine can take care of that problem. Meanwhile, proximity to research hospitals in NYC is a benefit.

Product line expertise is an ideal candidate for an apprenticeship program. The Technology Advisory Network recommends that LWD consider electroceuticals management as a forward-thinking approach to workforce development.

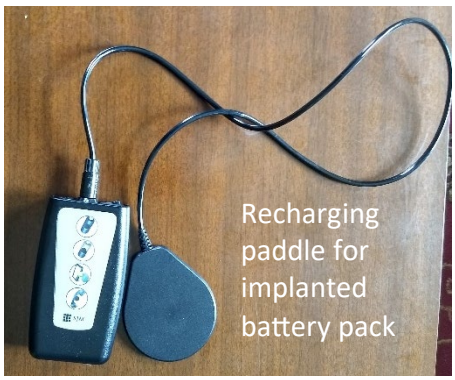
Beth Kujan; **kujan@njit.edu**; Technology Advisory Network Director for HCTN

Programming Implanted Electroceutical Device

In this back-page essay, we will be considering only implanted devices for chronic, debilitating conditions. However similar attention can be given to non-invasive devices such as vagus-nerve stimulators for episodic migraine relief which offer the same market opportunity.

Electroceutical devices work by transforming electrical signals passed along the nerves of the body. Ideally, the change-up affects only signals occurring with a disease such as multiple sclerosis, complications from Lyme disease like Sjogren's syndrome or in association with spinal cord damage. These neuropathic signals result in pain.

Neuropathic pain can manifest as burning, coldness, "pins and needles" sensation, numbness or full-body itching. It needs no external stimulus; it is literally in the mind. As a solution, neuromodulators have been bioengineered to simulate the deep brain, the motor cortex or the spinal cord as needed to neutralize the pain signal.



No one starts with brain surgery to relieve pain. All the other options must first be exhausted. This would include opioids like fentanyl patches, medical marijuana and back surgery.

Once a decision is made to fit a deep brain stimulation device, a very long process begins.

Test surgeries precede implantation. The chosen technology is calibrated against surgical data. Choices about battery life must be made. The surgery is intense and weeks of recovery follow.

Then there is life-time follow-up. Follow-up care from device makers is the opportunity space.

So, what is the ongoing role of follow-up by a device-maker's technical representative?

#1. It's highly personal. The manufacturer's representative is in the operating room during implantation. He/she is the one to calibrate the unit afterwards – by phone or at the patient's home.

#2. It's a training exercise. As of today, the units are programable, but not with a user-friendly interface. The patient must be trained to modulate the unit. Also, the battery pack requires recharging. Since the battery pack is internal to the patient, it is recharged using magnetic induction. This is the same technology used by the **powermat spots** on Starbucks café tables. The recharging unit can be administered with a paddle and belt as shown above.

#3. It's a forever relationship. Once someone has had a 5-year or 10-year device implanted, they're not going to swap it out like a new fashion. It may cost has much as a car (or motorhome!) but it isn't returnable. The job of the technical expert is therefore a stable job.

Beth Kujan; **kujan@njit.edu**; Technology Advisory Network Director for HCTN