

Because there are regions of the body and types of chronic pain that spinal cord stimulation just can't help—for example, chronic post surgical pain following an amputation, thoracotomy, hernia or mastectomy, or the occipital nerve implicated in chronic headaches--Jon Snyder, a former CEO-in-residence at BioEnterprise (a regional incubator in Cleveland, OH) started up Neuros Medical in 2008 to create a platform suitable for peripheral nerve block stimulation.

Snyder had a great deal of familiarity with the neurostimulation markets, having served as a sales and marketing executive at **Cyberonics Inc.** (Most recently Snyder was head of marketing for the surgical instrumentation division of Cardinal Health.)

Snyder didn't need to look far for the company's core technology. At BioEnterprise, he happened to be right across the street from **Case Western Reserve University**, where Kevin Kilgore, PhD, and Niloy Bhadra, MD, PhD, both with the department of biomedical engineering, were developing a neurostimulation device called *Nerve Block*, to treat pain that originates in the peripheral nervous system. Neuros gained an exclusive license to that IP from Case Western Reserve University, and in 2009 raised a series A round of \$1.8 million from North Coast Angel Fund, Glengary Ohio Tech Angel Fund, Queen City Angels First Fund III and individual investors. [W#200930570]

Neuros is developing a device that consists of an electrode, which is attached at one end to a particular nerve in the peripheral nervous system and at the other to a small pacemaker-sized stimulator that can be placed in the lower leg, the outer thigh, the chest pocket or the abdomen, depending upon the particular pain application.

According to Snyder, Neuros is offering something very different from spinal cord stimulation. "We stimulate at a much higher frequency. Spinal cord stimulation fires at about 30-100 herz. We stimulate at about 5,000 herz, and as a result, block nerve activity at the focal point in the peripheral nervous system where the pain originates." Snyder explains that in contrast, SCS doesn't stop the pain signal in its tracks; instead, it masks it, creating a feeling of tingling along the spinal column.

Neuros plans to first enter the market with a focus on residual limb pain, for patients that continue to feel pain at the stump post-amputation. (This is distinct from phantom limb pain, where patients' pain seems to originate from the place where the limb used to be.) There are almost one million patients with intractable residual limb pain, according Snyder, which can arise when small benign tumors called neuromas develop on the tip of cut nerves. Only 30% of patients with residual limb pain respond to currently available treatments.

To increase its odds for success in the clinic and with payors, Neuros has adopted the model of SCS, screening patients to determine which can benefit from *Nerve Block* before the implantation procedure. Before the surgery, the pain physician will inject lidocaine or another short-acting local anesthetic into the treatment area. If the patient experiences pain relief, he or she will be a good candidate for the Neuros technology.

Snyder notes that in contrast to other companies working in neurostimulation, Neuros knows the mechanism of action of its therapy. "We are blocking the action potential of a particular nerve. Knowing the mechanism of action, then showing that it works in a clinical study, will be helpful in gaining adoption," he says.

Future large potential markets for the Neuros peripheral nerve blocking technology include post-surgical patients with chronic pain, of which there are 500,000, occipital neuralgia, perhaps chronic migraine, which afflicts 25-30 million patients in the US, and facial pain caused by trigeminal neuralgia. Neuros plans to begin clinical trials in 2010 and hopes to be on the market by 2012.

Both because the company can predict which patients might benefit from its treatment and because that treatment is easily reversible (simply by turning it off) Snyder believes that *Nerve Block* has the potential to move up in the treatment continuum, before opioid use. Of course, with a device in the \$15,000-\$16,000 range cost is an issue, but Snyder says in chronic pain, he thinks use of the device will yield an ROI in three years in terms of the medications a patient would have otherwise used in that time frame. In addition, lost days of work and the financial impact to the overall economy are hidden costs due to poorly managed pain, he says.