

“THIS IS FUNDAMENTALLY DIFFERENT TECHNOLOGY FOR BRAIN STIMULATION, AND THAT’S WHY IT’S VERY EXCITING”

PAUL HOUSE, MD

By Diana DeCouteau



# NEUROPACE CALMS STORMS IN THE EPILEPTIC BRAIN

Electrical storms in the brain—that’s how the seizures that plague patients with epilepsy are sometimes described. As many as 3 million Americans experience these storms frequently, sometimes three or four times a week. Their quality of life diminishes dramatically, not just during seizures but overall, as they struggle to live independently, find jobs, socialize, and even drive.

Medications control seizures completely in only 60 percent of patients. For the rest, surgery may be an option when seizures originate from a single foci in the brain. But if surgery would create a neurological deficit—such as a loss of strength or speed—or if seizures originate from two or more foci, doctors and patients are forced to pursue other options.

Until recently, many patients with uncontrolled seizures had few other choices. University of Utah Health Care (UUHC) is now one of the few medical centers nationally offering a proven new treatment to control seizures: the programmable NeuroPace Responsive Neurostimulator (RNS®).

“This is fundamentally different technology for brain stimulation, and that’s why it’s very exciting,” says Paul A. House, MD, assistant

professor of neurosurgery. “It has a sensing component as well as a stimulation component, and you can optimize both.”

Earlier technology stimulated the brain only. But NeuroPace also detects previously identified patterns of abnormal brainwaves and delivers responsive electrical stimulation to interrupt those patterns before the patient suffers clinical seizures. Sensing is critical, because patients don’t always know when they have seizures. NeuroPace does.

The NeuroPace device is surgically implanted in the skull and connected to seizure locations via electrodes. To qualify for the surgery, patients must be over 18, with seizures emanating from no more than two foci. They must experience frequent and disabling seizures that two or more medications have not relieved.

During the evaluation process, candidates go through several tests to determine where seizures originate. Much of the monitoring is non-invasive, but most patients undergo at least one invasive procedure—a preliminary surgery to perform a video encephalogram that records seizures. In addition, neuropsychological testing looks at the strengths and weaknesses of brain function, to determine what impact surgery

might have. To make a final recommendation for or against surgery, a team including Dr. House, along with neurologists, radiologists, and neuropsychologists review the tests.

If surgery is confirmed, Dr. House secures the NeuroPace device in the skull. The device itself is a 2-by-1-inch hermetically sealed titanium enclosure containing electronic circuitry and a battery. It connects to seizure foci using paddle electrodes placed on the brain or depth electrodes inserted within.

After surgery, clinicians can noninvasively adjust detection and stimulation settings on NeuroPace using a programmer that communicates via short-range radiofrequency link.

“With NeuroPace, we’re capturing brainwaves from every seizure,” says Dr. House. “Different types of seizures from different brain areas provide different fingerprints of abnormal activity. We have known places to start when treating them.”

“By optimizing frequency, amplitude, voltage, and other stimulation parameters, we improve seizure control in patients over time.

We constantly get feedback, so we can see what’s working and what’s not, and fine-tune our approach. In fact, the information provided by NeuroPace can even help fine-tune medical therapy.”

For most patients, implanting NeuroPace reduces the number of seizures within months—and the reduction increases over time. Studies confirm that most patients had 50 percent and 60 percent fewer seizures at four and five years after the implant. “Reducing the number of distinct abnormal events that the brain experiences helps calm it down,” says Dr. House.

NeuroPace surgery is just one example of UUHC’s regional leadership in epilepsy treatment, which includes clinical work, research trials, and a staff that is growing with the addition of several epileptologists. But Dr. House may be most enthusiastic about the knowledge NeuroPace provides and the improved outlook it offers patients with epilepsy.

“NeuroPace gives us information about the brain and treating epilepsy that we’ve never had,” he says. “And it’s helping patients who previously had few options.”