Welcome! Thank you for joining us today for “Neuromodulation and How It Could Benefit You.” This Facebook chat will be hosted by Dr. Konstantin V. Slavin and will cover topics such as:

- How Neuromodulation works
- What is involved in getting a neurostimulator implanted
- Types of Neuromodulation, including Spinal Cord Stimulation, Peripheral Nerve Stimulation and Deep Brain Stimulation
- Pain conditions that may benefit from Neuromodulation
- Results that patients may expect from Neuromodulation

Dr. Slavin is a professor of neurosurgery in the University of Illinois at Chicago where he heads the section of Stereotactic and Functional Neurosurgery. He authored and co-authored more than a hundred chapters and peer-reviewed articles, as well as edited a book on Peripheral Nerve Stimulation. Dr. Slavin has received many clinical and professional awards, including “Most Compassionate Doctor,” and for many years has been included in the prestigious “Top Surgeons” and “Best Doctors” lists in USA.

Now, please join us in welcoming Dr. Slavin!

Dr. Slavin: Hello, everybody! It is a great honor for me to be invited today to this Facebook chat—and I want to thank PainPathways for arranging and hosting this event. I look forward to an hour of discussion on this fascinating topic!

Dr. Slavin: As you just heard, I work in the department of neurosurgery in the University of Illinois at Chicago and I do specialize in surgical treatment of chronic pain, movement disorder, epilepsy and psychiatric conditions, my field of interest is what’s called “functional neurosurgery.”

My particular clinical interests include treatment of facial pain, as well as all kinds of neuromodulation procedures, including those that were considered experimental when I started my medical career over 25 years ago and have become mainstream treatments by now!
Dr. Slavin: As you may see from the introduction to this chat, neuromodulation is a modality that changes the way our nervous system works through various reversible interventions. This can be done with electricity—what we call electrical neuromodulation—this includes spinal cord stimulation that is used for treatment of pain, deep brain stimulation that is used for treatment of tremor and Parkinson’s disease, peripheral nerve stimulation, etc. Neuromodulation may also be done with different medications, neurotransmitters, etc—this is called chemical neuromodulation—and the best example of this would be implanted pumps with either pain-relieving medications or with drugs that treat spasticity.

Dr. Slavin: Chronic pain is the largest part of neuromodulation indications—the number of procedures that use neuromodulation for treatment of all kinds of chronic pain in the United States is higher than all other indications together (Parkinson disease, tremor, dystonia, spasticity, epilepsy, obsessive-compulsive disorder, depression, etc.)—and therefore it is not surprising that we will be focusing on neuromodulation for pain in our conversation today.

Carol: When did neuromodulation become a recognized treatment?

Dr. Slavin: Neuromodulation has been used for various indications for more than half a century—there are many reports on using electrical stimulation for chronic pain in the mid-sixties and seventies. It has become mainstream since late 1980s, when devices became approved by the FDA.

Linda: Can every pain physician prescribe neurostimulation, like a spinal cord stimulator?

Dr. Slavin: Great question: Yes, every physician can recommend spinal cord stimulation as a treatment for his/her patients! One, however, needs special training to implant these devices. Most pain specialists have this skill, but in some cases, the patients have to be referred to a surgeon for the device implantation.

Kascha: Dr. Slavin, thank you for your time and expertise. My husband has terrible headaches caused by cervical spinal stenosis and severe arthritis. It's all nerve pain and he is not a good candidate for spinal surgery of any kind. Is there a possibility he should be evaluated for neuromodulation? When we looked into this years ago, it wasn't used for nerve pain above the shoulders, has that changed?

Dr. Slavin: Yes, the short answer is yes, it can be considered for treatment of pain in the neck and head—but the general rule of thumb would be to eliminate a correctable problem, such as spinal stenosis. Keep in mind, this forum does not provide medical advice—we are talking about a general approach to the problems.
Magen: How effective is this over time? Is this something that will be beneficial for a few years or for a lifetime? I suffer from chronic back, neck, shoulder pain and horrible headaches (I believe due to the injury).

Dr. Slavin: The long-term effectiveness of neuromodulation in general, and spinal cord stimulation in particular, is quite high—more than a half of implanted patients continue using devices for 5 years or longer. Our goal, as you may imagine, is to relieve the pain permanently, or at least until a better and safer treatment is developed.

Dawn: I have the neurostimulator and it does not work properly. I heard that it is more invasive to take out then put in. Is this true?

Dr. Slavin: Not necessarily—we frequently remove devices when there are medical reasons (infection, pain, etc.) or when the patients do not use them for a long period of time (hopefully because their pain got better!)

In general, however, we would not want to put our patient through another surgery (as it does indeed carry some risks) if the device does not bother them. In some cases, removing may be quite difficult—and we would advise the patient to keep it in rather than go through risk of taking it out.
**Wendy:** If someone tried a peripheral nerve stimulator a decade ago and it made the trouble worse, has the science and stimulators changed so much that it might be worth another try? Or are they still rather similar?

**Dr. Slavin:** I guess it all depends on why this modality did not work during the original attempt—the technology has advanced quite a bit, but the general principles remain the same. It may be worthwhile to re-visit this option with your pain specialist and discuss this in more detail.

**Vanessa:** Has this been used in many RSD/CPRS patients? If so, usually at what stage or after trying how many other options?

**Dr. Slavin:** Yes, RSD/CRPS is considered one of the best indications for electrical neuromodulation—both spinal cord stimulation (SCS) and peripheral nerve stimulation (PNS) have been successfully tried for this indication. We recommend considering neurostimulation early on, before the trophic symptoms develop.

**PainPathways:** Here is another article on neuromodulation from the Fall 2014 issue:

http://www.painpathways.org/neuromodulation-101/
**Reader:** Dr. Slavin, what is known about the long-term effects of stimulation the body wouldn't normally experience/produce on its own?

**Dr. Slavin:** So far, long-term safety has not been a concern—the human body seems to be very receptive to low-power stimulation that is delivered by neuromodulation devices to the nerves, spinal cord or the brain.

All our neural activity is to some extent electrical in nature—so we are essentially augmenting or suppressing something that our body does anyway.

**Reader:** Could you please explain how neuromodulation can treat depression?

**Dr. Slavin:** We do not know (yet!) exact mechanism of neuromodulation in treatment of depression—and we have been using both vagal nerve stimulation (VNS) and deep brain stimulation (DBS) for this indication—but it appears that we can normalize some abnormal brain activity, selectively affect cerebral circuitry and perhaps break some vicious cycles that may be responsible for clinical signs of depression.

**PainPathways:** Dr. Slavin is a member of the North American Neuromodulation Society (NANS). NANS' mission is to support multidisciplinary collaboration among patients, clinicians, scientists, engineers, and others to advance neuromodulation through research and education. Many thanks to NANS for their support of the fall issue of PainPathways Magazine. To learn more, visit www.neuromodulation.org.

**Magen:** I have two herniated discs in my thoracic spine and one in my cervical spine, I also have vertebrae that is rubbing together in my cervical spine due to the herniated disc, I have been told by specialist that surgery is not an option as it would make things greatly worse. So in having something like this done, knowing that this pain will never go away and is only going to get worse and has gotten worse already, would this be an answer? Would the Neuromodulation help with the pain I have now and the pain I have coming?

**Dr. Slavin:** You are correct, we do recommend fixing structural problems first—and if the bones and herniated disks produce significant narrowing of the spinal canal, we do suggest having them decompressed and the herniations addressed. But if the pain continues after decompression, spinal cord stimulation and other neuromodulation approaches would be a very good next step to consider.

**Alex:** I’d like to know more about how neurostimulation helps obsessive-compulsive disorder. Is there any relationship to electroshock therapy?

**Dr. Slavin:** So far, the only neuromodulation approach that we use for obsessive compulsive disorder (OCD), is deep brain stimulation—in the United States it is approved on a Humanitarian Device Exemption basis for quite a few years now.

It seems to work differently from other electrical treatments—from what I hear from my patients, stimulation produces sensation of calm, and relieves both obsessions and compulsions.
Debbie: Is there a difference between neurostimulation and the Calmar therapy also known as scrambler therapy? I have done quite a few scrambler treatments and it helped lower my pain but when I suffered a bad flare of the nerve pain nothing but an increase in my pain patch has helped? Would you recommend anything for nerve entrapment?

Dr. Slavin: I am not an expert in “Calmar (scrambler) therapy”—but I can tell you that pain from nerve entrapment that continues after this entrapment is surgically relieved is a great indication for neurostimulation!

Judy: Is neuromodulation approved for TN pain?

Dr. Slavin: We do not recommend neuromodulation for trigeminal neuralgia—but we frequently use it for neuropathic pain in the face (other than trigeminal neuralgia). In my practice, we’ve published our initial experience almost 10 years ago and continue using this approach for a very specific patient population. However, in terms of regulatory approval, this remains determined on an individual basis since none of the devices on the market today are specifically approved for use in facial pain.

Cindy: I have severe neck, back & shoulder pain, with chronic migraines. If I get a neuro stimulator, I’ve heard that you cannot get an MRI. Has this changed yet? I have MRI’s often in the brain & spine to watch for possible lesions, for probable MS. I have all of the symptoms, but no active lesions as of yet. I have small grey matter. My Drs are baffled. Do you have a good MS specialist there? I am two hours south, in Champaign.

Dr. Slavin: You are correct, there is only one group of devices on the market today that is conditionally approved for MRI—but this approval would not apply if the device is used for treatment of migraines...

I have treated patients who have both multiple sclerosis and migraine headaches, and one has to think twice before using neurostimulation for this very reason of inability to get an MRI after the device is implanted.

Susan: I have pain that goes down the left side of my face and the top of the inside of my mouth. It is constant burning pain. It started suddenly 13 yrs ago and (I) have been suffering ever since. I have no answers except for medication, which gives me some relief. Do you have any suggestions Dr Slavin.

Dr. Slavin: It is hard to say if neurostimulation would be an option for such a complicated clinical picture...Nevertheless, it may be worthwhile to meet with a pain specialist that has interest and expertise in neurostimulation to see if there is anything they can offer!

Margaret: I’ve had a neuromodulation device for 2 years: Interstim. I have Chronic IC with Hunners Ulcers, Lupus, and just recently was diagnosed with IBS. Has it been shown that there are specific settings to help with the IBS symptoms? Can there be other wires added to the device and attached to certain nerve points?
**Dr. Slavin:** Pelvic pain and other disorders of pelvic function such as interstitial cystitis, have been successfully treated with sacral nerve root stimulation—but the response appears to be lower than we wish...

InterStim is very effective for disorders of urination, and there are neurostimulation approaches for fecal incontinence, so it may be worthwhile to inquire with one’s urologists if they would consider adjusting or revising the existent system to provide better symptomatic improvement.

**Kerry:** I had an earlier stimulator that went bad and I had to have it removed. My recent Lumbar fusion has not go as planned and my pain doc may recommend the implant of another one. How has technology changed? Have they improved?

**Dr. Slavin:** There is a lot of innovation in stimulation technology, but the principles so far remain the same. As new approaches develop, we may be re-visiting those patients who failed trials in the past to see if these new paradigms are more effective for their pain. I expect these new technologies to be available within a year or two.

**Keri:** How long so you recommend a trial to be? I’ve had in retractable rt sided groin & rectal pain. My doc will be putting two quad leads @ L1-L2 in dorsal root ganglion & on my rt sided one octolead @ T11,T12, & L1. I’ve had a couple trials in 2012 (diff area & approach) but only relieved my pain 30% but I remember feeling confused cuz I felt like the trial should have lasted a bit longer. It takes a few days to recover from trial then to concentrate on if it helps or not. I do understand infection risks increase the longer one has it.

**Dr. Slavin:** Spinal cord stimulation trials may be as short as 1 day and as long as several weeks. Every physician has his/her own preferences—my trials last 1 week for everybody. 30% improvement would normally be considered a failed trial—and if you ever consider repeating the trial, make sure you and your doctor have realistic expectations so there is no disappointment if the trial fails (and no false failures—as, for example, if 30% is a better relief than you are getting with all other treatments).

**Mary Kay:** I cannot locate the main *PainPathways* page. I had 2 questions if either or both could be asked. Can RSD that was brought on from a bad car accident that sustained a crush injury to my ankle have brought on fibromyalgia? Also, can this new treatment help fibromyalgia pain?

**Dr. Slavin:** I am not aware of RSD (CRPS type 1) that was caused by a crush injury to evolve into fibromyalgia—this deserves deep investigation as to the exact nature of the pain syndrome. So far, none of the established neuromodulation modalities has been shown effective—or approved—for treatment of fibromyalgia pain. There is, however, an active research project in Europe to investigate potential usefulness of occipital nerve stimulation for fibromyalgia pain control.

**PainPathways:** Hi everyone! This is Amy North, editor of *PainPathways* Magazine. On behalf of Dr. Richard Rauck, we’d like to thank Dr. Slavin and all those who participated in tonight’s
chat! We are excited to be offering this great forum for information and inspiration. Have a good night everyone!

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