UNDERSTANDING THE DIFFERENT TYPES OF PAIN MANAGEMENT DEVICES AND NEUROMODULATION THERAPIES

The International Neuromodulation Society defines neuromodulation as "the alteration of nerve activity through targeted delivery of a stimulus, such as electrical stimulation or chemical agents, to specific neurological sites in the body." But the therapies within this category vary widely in terms of type of stimulation used, intensity of the stimulation, placement, and other factors. **Here are some examples.**

External pain management devices

- **DEEP OSCILLATION THERAPY:** A handheld device that targets areas with intermittent electrostatic waves, creating a deep kneading effect.
- **HIGH-FREQUENCY IMPULSE THERAPY**: A noninvasive stimulation device that combines high and low frequencies to reduce pain.
- **H-WAVE:** A device that uses stimulation to emulate the H waveform found in nerve
- signals, providing high- and low-frequency muscle stimulation and high-frequency pain relief.
- **INTERFERENTIAL CURRENT STIMULATION:** A type of electrical stimulation that uses paired electrodes of two independent circuits to carry high- and medium-frequency alternating currents to a painful area.
- **NEUROMUSCULAR ELECTRICAL STIMULATION:** The electrical stimulation of selected muscle groups using electrodes; may be used to treat muscle atrophy and "re-educate" the muscles, or used to enhance functional activity.
- **PERCUTANEOUS ELECTRICAL NERVE STIMULATION:** Neuromodulation treatment where needles are inserted into the skin near the nerves, stimulating the painful area with a current.
- **PULSED ELECTROMAGNETIC FIELD THERAPY:** This therapy uses low-level electromagnetic waves that accelerate the body's ability to repair injured cells by increasing blood flow and reducing inflammation.
- **SCRAMBLER THERAPY:** Using external leads, "scrambled" electrical signals are conducted through nerves so that the brain perceives them as normal, non-pain signals.
- **TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION:** Commonly known as TENS units, these devices transmit low-voltage electrical currents through the skin to stimulate nerve fibers for short-term pain relief.
- **VAGUS NERVE STIMULATION:** A device that delivers electrical impulses through the skin to stimulate the vagus nerve in the neck and help reduce pain. It is typically used noninvasively for pain management, but may be implanted for certain conditions.

Implanted neuromodulation devices

- **DORSAL ROOT GANGLION STIMULATION:** Similar to traditional spinal cord stimulation. Rather than placing the electrodes over the posterior aspect of the spinal cord, leads are implanted on the dorsal root ganglion, a nerve cluster within the epidural space.
- **INTRATHECAL DRUG DELIVERY**: Implanted intrathecal drug delivery devices with catheters in the spinal fluid can steadily supply medication. Opioids are commonly used with these intrathecal devices, but others can also be used, such as ziconotide, baclofen, and clonidine.
- **PERIPHERAL NERVE STIMULATION:** Peripheral nerve stimulation is a type of minimally invasive neuromodulation applied to the peripheral nerves, which extend beyond your brain and spinal cord to your organs and extremities—all the way to your fingertips and toes.
- **SPINAL CORD STIMULATION:** A small implanted device that delivers pulses of mild electric current to mask pain signals traveling to the brain. Patients typically trial the device externally before having it implanted.

Learn about a full range of pain management options at uspainfoundation.org.

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