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Relieving chronic pain

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A new, implantable device for treating chronic pain passes an important safety test.

Each year, more than 35,000 patients in the United States are implanted with spinal cord stimulators to treat chronic pain. Unfortunately, up to half of such patients receive only very limited pain relief. To help more patients, scientists are developing a new device to deliver therapeutic stimulation in a more targeted way, reaching nerve fibers deep within the spinal cord.

Standard devices, first introduced in 1967, work by delivering a low electrical current to the spinal cord that interferes with the body's pain signals. Such devices, however, are only able to deliver therapeutic current to a thin layer of nerve fibers along the outside of the spinal cord. That's because the electrodes delivering the current are placed within the cerebrospinal fluid, which is itself conductive and so dissipates some of the current.

The new device, called the Human Spinal Cord Modulation System (HSCMS), is designed to be in direct contact with the spinal cord, held in place by a small loop of wire. Because the spinal cord moves during normal patient activity, that loop has to exert enough pressure for the HSCMS to stay in contact with the spinal cord but not so much that the pressure restricts blood flow or causes direct injury.

To test the pressure exerted by the HSCMS's design, researchers attached the device to a silicone model of the spinal cord previously

developed to have the same biomechanical characteristics as living tissue. They then slowly compressed the loop, measuring the pressure exerted on the silicone model. The results, which were accepted for publication in the American Institute of Physics (AIP) *Journal of Applied Physics*, show the device's loop design exerts pressure at a similar level as is normally found on the spinal cords of healthy people, and so passes an important safety test for further development of the device.

More information: "Dynamic loading characteristics of an intradural spinal cord stimulator" is published in the *Journal of Applied Physics*. jap.aip.org/resource/1/japiau/v113/i2/p026103_s1

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