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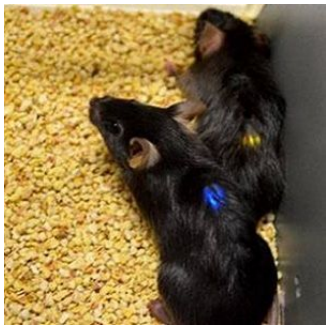
Wireless Devices Manage Pain Signals



New implantable wireless devices can be used to trigger — and, in theory, block — pain signals in the body and spinal cord before those signals reach the brain, according to a new study published in the journal *Nature Biotechnology*. Researchers say the implants may one day be used in different parts of the body to fight pain that doesn't respond to other therapies.

The new devices are soft and stretchable and can be implanted into parts of the body that move, unlike the previous models developed by the researchers which had to be anchored to bone.

Ultimately, the goal is to use this technology "to treat pain in very specific locations by providing a kind of 'switch' to turn off the pain signals long before they reach the brain," says co-senior investigator Robert W. Gereau IV, PhD, the Dr. Seymour and Rose T. Brown Professor of Anaesthesiology and director of the Washington University Pain Center.

The new devices are held in place with sutures. Like the previous models, they contain microLED lights that can activate specific nerve cells. The devices have been tested in mice that were genetically engineered to have light-sensitive proteins on some of their nerve cells.

To show that the implants could influence the pain pathway in nerve cells, the researchers activated a pain response with light. When the mice walked through a specific area in a maze, the implanted devices lit up and caused the mice to feel discomfort. Upon leaving that part of the maze, the devices switched off, and the discomfort dissipated. As a result, the animals quickly learned to avoid that part of the maze. This kind of experiment would have been very difficult with older optogenetic devices, which are tethered to a power source and can inhibit the movement of the mice.

The new, smaller implants also may have potential uses in or around the bladder, stomach, intestines, heart or other organs, according to co-principal investigator John A. Rogers, PhD, professor of materials science and engineering at the University of Illinois. "They provide unique, biocompatible platforms for wireless delivery of light to virtually any targeted organ in the body," he adds.

The team designed the implants with an eye toward manufacturing processes that would allow for mass production so the devices could be available to other researchers. Rogers, Gereau and Michael R. Bruchas, PhD, associate professor of anaesthesiology at Washington University, have launched a company called NeuroLux to aid in that goal.

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