

Nerve Treatment When Drugs Fail

Scientists try stimulating the vagus nerve to help migraines, rheumatoid arthritis and stroke, among other conditions



The slow, deep breathing in meditation naturally stimulates the vagus nerve, which promotes relaxation. PHOTO: GETTY IMAGES



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3 COMMENTS

Medical scientists increasingly are tapping into the healing powers of the vagus nerve, which regulates the function of many of the body's organs.

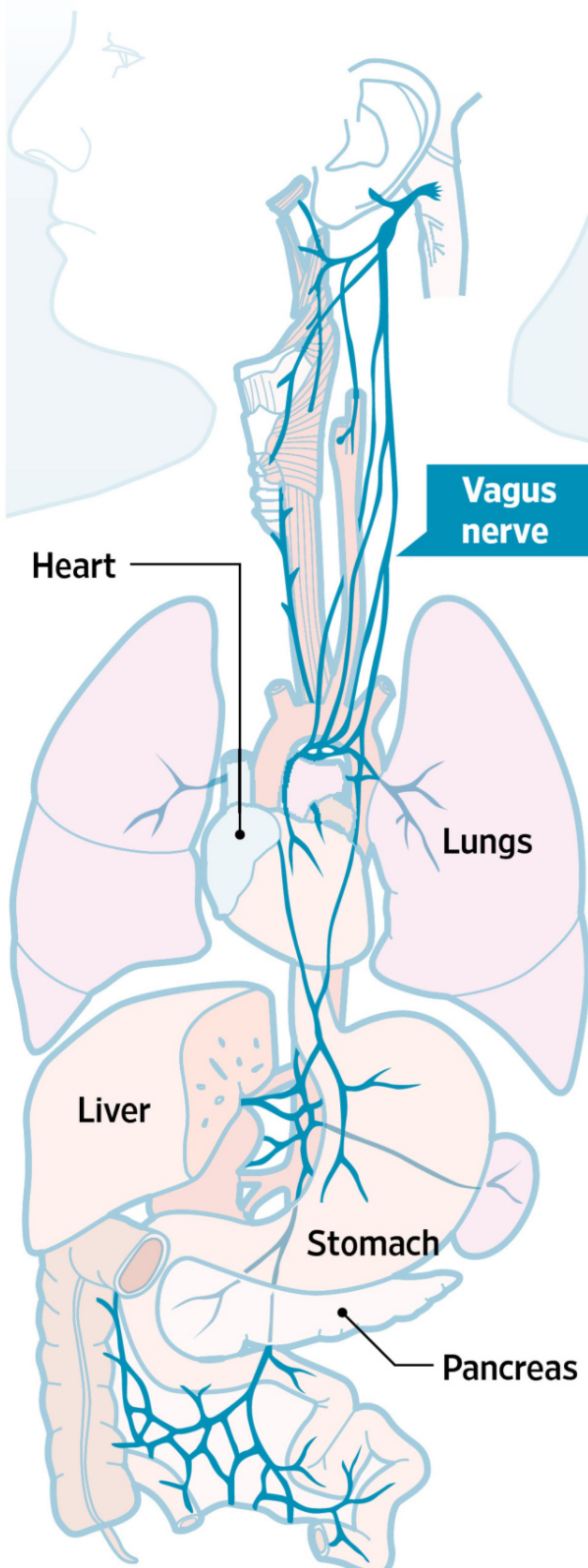
Every breath we take, especially the slow, deep breathing used in meditation, stimulates the vagus nerve to calm the body. Scientists also believe stimulating the nerve with small electrical impulses can have far reaching potential to treat medical conditions including migraines, rheumatoid arthritis and strokes.

Targeting nerves for treatment is a new approach researchers are pursuing largely because drugs haven't proved effective at treating neurological disorders and have significant side effects, says Michael Kilgard, a professor of neuroscience at the University of Texas at Dallas. By contrast, nerve stimulation can be targeted at specific nerves and at specific times, so side effects are much reduced, he says.

The National Institutes of Health last year launched the Sparc program, short for Stimulating Peripheral Activity to Relieve Conditions, to fund projects looking at the neural control of organ function. The agency has funded more than \$20 million to research projects over the next six years.

The Wandering Nerve

The vagus nerve runs from the brainstem to the chest and abdomen, transmitting information between the brain and various organs in the body.



Source: Pearson Education Inc. THE WALL STREET JOURNAL.

Vagus nerve stimulation, or VNS, has long been approved for use in the U.S. to treat severe and difficult epilepsy cases and treatment-resistant depression. Surgery is required to implant a pacemaker-like device in the body. Another device that blocks signals to the vagus nerve was approved last year to treat obesity.

A hand-held VNS device, which avoids the need for surgery, is used in Europe for migraines, and the Food and Drug Administration is currently reviewing an application for the product in the U.S.

The vagus nerve, which takes its name from the Latin root for wandering, is the longest cranial nerve in the body, comprising a network of some 100,000 nerve fibers that run from the brain stem to the organs in the abdomen and chest, including the heart, lung and liver. Its job is to regulate involuntary actions, such as breathing and digesting food. At its thickest, the nerve is the width of a thin pencil.

"The vagus nerve is the way the body tells the brain what's going on," Dr. Kilgard says. When it is stimulated electrically, patients usually feel nothing or very little because it isn't a motor or tactile sensory nerve, he says.

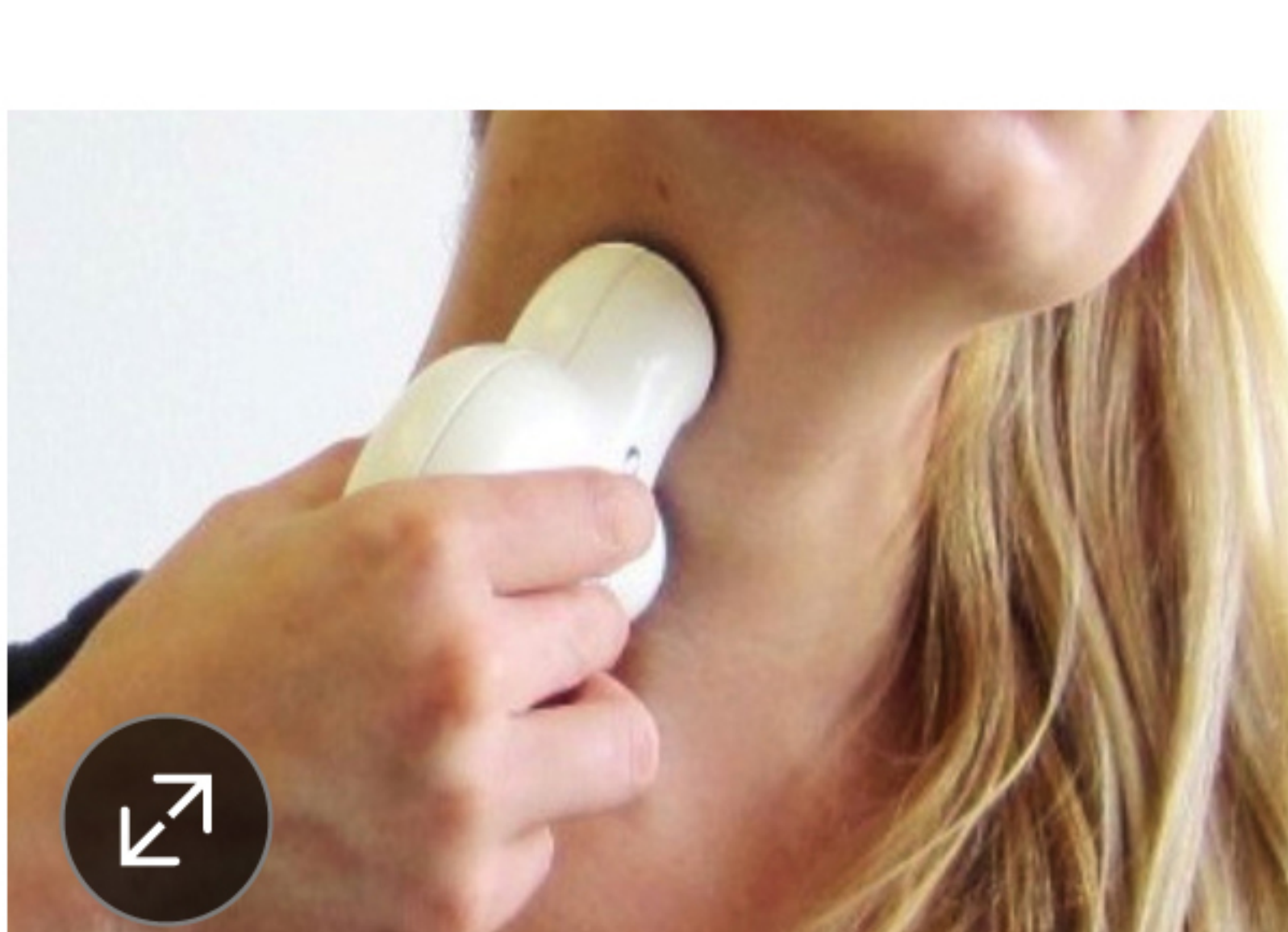
says.

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A small study published in July in the Proceedings of the National Academy of Sciences showed that stimulating the vagus nerve with an implanted device that delivered electrical impulses to the neck can reduce inflammation and symptoms

in rheumatoid-arthritis patients. Kevin Tracey, president of Northwell Health's Feinstein Institute for Medical Research who collaborated on the study, says clinical trials are moving forward with a larger sample of patients.



ElectroCore LLC, a Basking Ridge, N.J.-based biotech company, is awaiting an FDA decision on its GammaCore medical device for the treatment of episodic cluster headaches. These are extremely painful headaches that occur several times a day for a few months, go away and then reappear. The device, which is placed externally on the neck for several minutes a few times a day, has been approved for use in Europe since 2011. PHOTO: ELECTROCORE

Potential problems could arise if too much electrical power is used during VNS, which can slow a person's heart rate too much, says Stephen Silberstein, a professor of neurology at Thomas Jefferson University, in Philadelphia, who has studied VNS and migraines. "If you can selectively stimulate the sensory parts of the vagus nerve that only go into the brain you then have something that is safe which doesn't affect the heart rate at all," he says.

Dr. Kilgard, of the University of Texas, has studied using VNS to treat tinnitus, or ringing of the ears. "You can reorganize the brain and how it processes sound by taking control of this nerve and activating it," he says.

He is also researching how VNS could be used to treat stroke. In a small, 20-person study [published earlier this year in the journal Stroke](#), Dr. Kilgard and colleagues found that stroke patients who got six weeks of VNS plus standard rehabilitation therapy had regained three times as much movement as those who got rehabilitation alone.

While patients were relearning basic movements, such as opening and closing the hand, therapists for the VNS group pushed a button to wirelessly activate a stimulation device implanted in their chests.

Dr. Kilgard says he also has received grant funding to test similar technology in children with autism in an effort to help them learn social cues.

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