

New brain stimulation treatment may offer hope for those with treatment resistant depression

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A new neurosurgical procedure may prove helpful for patients with treatment-resistant depression. Bilateral epidural prefrontal cortical stimulation (EpCS) was found generally safe and provided significant improvement of depressive symptoms in a small group of patients, according to lead researcher Ziad Nahas, M.D. at the Medical University of South Carolina. The data are reported in the on-line issue of *Biological Psychiatry*.

Treatment-resistant depression is a recurrent psychiatric illness and a leading cause of premature morality due to suicide and associated medical conditions. In the U.S., more than 3.2 million patients are diagnosed with treatment-resistant depression. Typically, patients have tried several medications and treatments without success or improvement.

EpCS targets electrical stimulation to the anterior frontal poles and the lateral prefrontal cortex. "We focused on these two regions because they are part of a larger brain networks critical in regulating mood. Both play complementary roles integrating emotional and cognitive experiences and offer a distinct opportunity for targeted antidepressant treatments" said Dr. Nahas, an associate professor of Psychiatry, Physiology and Neuroscience and Director of the Mood Disorders Program at MUSC. "Cortical stimulation has several advantages provided that it shows efficacy in treating depression. It is reversible, non-destructive and



potentially safer than other forms of invasive brain stimulation since the stimulating paddles don't come in direct contact with the brain." His team included MUSC neurosurgeon Istvan Takacs, MD and MUSC anesthesiologist Scott Reeves, MD.

Five patients were implanted with EpCS over the anterior frontal poles and the lateral prefrontal cortex bilaterally. Four separate paddle leads were then connected to two small generators surgically implanted in the upper chest area of the patient. The researchers individualized the treatment parameters for each patient to maximize the long-term antidepressant effects. They relied in part on input from the patients themselves who signaled positive mood changes when first stimulated. In general, their devices were set to periodically deliver electrical charges at intensities below the seizure threshold. The devices were never active at night. Only patients who failed to respond to several antidepressant treatments - including medications, psychotherapy, transcranial magnetic stimulation, vagus nerve stimulation or electroconvulsive therapy, were included in the study.

Patients were closely followed after the surgical implant and evaluated regularly using standard clinical ratings. After seven months, the average improvement was 54.9 percent based on the Hamilton Rating Scare for <u>Depression</u> and 60.1 percent on the Inventory of Depressive Symptoms Self Report . Three of the patients reached remission. One patient experienced a scalp infection that required removing the implants over the left hemisphere.

"These preliminary results are encouraging but not definitive," said Dr. Nahas. "Now that we have a proof of concept, we should aim at studying bilateral EpCS in larger placebo-controlled studies."

"The more sophisticated functions are on the surface of the brain" said Takacs. "We are trying to change the climate within the <u>prefrontal cortex</u>



so it could exert more adaptive governance of deeper brain regions." he said.

Source: Medical University of South Carolina

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