

Treating depression by stimulating the pleasure center

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Even with the best of available treatments, over a third of patients with depression may not achieve a satisfactory antidepressant response. Deep brain stimulation (DBS), a form of targeted electrical stimulation in the brain via implanted electrodes, is now undergoing careful testing to determine whether it could play a role in the treatment of patients who have not sufficiently improved during more traditional forms of treatment.

A major challenge of this work is determining the best region of the brain to stimulate. Some researchers stimulate the subgenual prefrontal cortex, a brain region implicated in depressed mood states, while others stimulate a region called the "anterior limb of the internal capsule", a nerve pathway that passes through the [basal ganglia](#), a lower brain region. Physicians publishing a new report in *Biological Psychiatry* now describe findings related to the stimulation of the nucleus accumbens, a brain region the size of a hazelnut associated with reward and motivation that is implicated in processing pleasurable stimuli, sometimes referred to as the "[pleasure center](#)" of the brain. The inability to experience pleasure is a key symptom of [depression](#) and previous studies have shown that functioning of the nucleus accumbens is impaired in depressed individuals.

Bewernick and colleagues administered DBS treatment in ten patients with severe long-term depression who had not responded to multiple other antidepressant treatments, including psychotherapy, drug treatments and electroconvulsive treatment. After one year of DBS, all

patients showed some improvement, and half of them experienced significant improvement in their symptoms of depression, astonishing considering they had not responded to any prior [antidepressant treatment](#). In addition, the patients showed reduced ratings of anxiety and had only minor side effects. Importantly, none of their overall brain functioning was impaired by the DBS treatment.

"The nucleus accumbens is a brain region that animals will seek to stimulate even if they do not appear depressed and this is one reason that it is sometimes referred to as a reward center. It is interesting to note that the patients in this study did not simply feel stimulated or euphoric; instead, there appeared to be reductions in depressed mood that paralleled an increase in the capacity for pleasure," commented Dr. John Krystal, Editor of *Biological Psychiatry*. "This finding will stimulate further study on the role of the nucleus accumbens in depression and its treatment."

The authors caution that because they studied only a small number of people, further research is necessary before DBS could be considered a clinically useful treatment for treatment-resistant depression. There are also important ethical considerations, since DBS treatment first requires potentially risky brain surgery. However, these preliminary findings are promising that DBS may provide relief to individuals with severe treatment-resistant depression.

More information: The article appears in *Biological Psychiatry*, Volume 67, Issue 2 (January 15, 2010).

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