

Binge eating improves with deep brain stimulation surgery

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Deep brain stimulation reduces binge eating in mice, suggesting that this surgery, which is approved for treatment of certain neurologic and psychiatric disorders, may also be an effective therapy for obesity. Presentation of the results will take place Sunday at The Endocrine Society's 94th Annual Meeting in Houston.

"Doing [brain surgery](#) for [obesity treatment](#) is a controversial idea," said the study's presenting author, Casey Halpern, MD, a fifth-year neurosurgery resident physician at the University of Pennsylvania, Philadelphia. "However, binge eating is a common feature of obese patients that frequently is associated with suboptimal treatment outcomes."

Currently the U.S. Food and Drug Administration has approved [deep brain stimulation](#) for use in various conditions that affect the brain, including Parkinson's disease and [essential tremor](#). The procedure does not destroy any part of the brain and typically does not cause pain, Halpern said.

Available treatments of obesity may inadequately address the neural basis of this compulsive overeating behavior, he suggested. A region of the brain called the [nucleus accumbens](#) is known to be dysregulated in both rodents and people who binge eat. Therefore, Halpern and his co-workers targeted that brain region with deep brain stimulation in a strain of obesity-prone mice.

The surgery involved implanting an electrode in the nucleus accumbens. Wires connected the electrode to an external neurostimulator, a device similar to a pacemaker. When switched on, the stimulator triggers the electrode to deliver continuous electrical pulses to the brain.

After recovery from surgery, the mice received high-fat food at the same time every day for one hour, and the researchers measured their food consumption. Binge eating was defined as consuming 25 percent or more of the usual daily caloric intake during this period.

For one week, mice consistently binged, eating almost half of their daily calories during this one hour, the authors reported. Then on alternating days, the investigators turned on the stimulator. On the days that deep brain stimulation was administered, or "on," the scientists observed a significant (approximately 60 percent) decrease in consumption of the high-fat diet. On the alternate days when they turned off the stimulator, binge eating returned, Halpern said.

The researchers then studied how deep brain stimulation might work to improve binge eating. With medications, they blocked various receptors of dopamine neurons, or nerve cells. Dopamine is a brain neurotransmitter, a chemical messenger, whose release in the brain is linked to the desire for rewarding behaviors such as eating high-fat food, according to Halpern.

Only one of the medications had an effect. Raclopride, which blocks the type 2 dopamine receptor, weakened the beneficial effect of deep brain stimulation by 50 percent.

Their results, Halpern said, showed that "at least one way that deep [brain stimulation](#) functions to suppress [binge eating](#) might be by modulating activity of neurons expressing the type 2 dopamine receptor."

Provided by The Endocrine Society

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