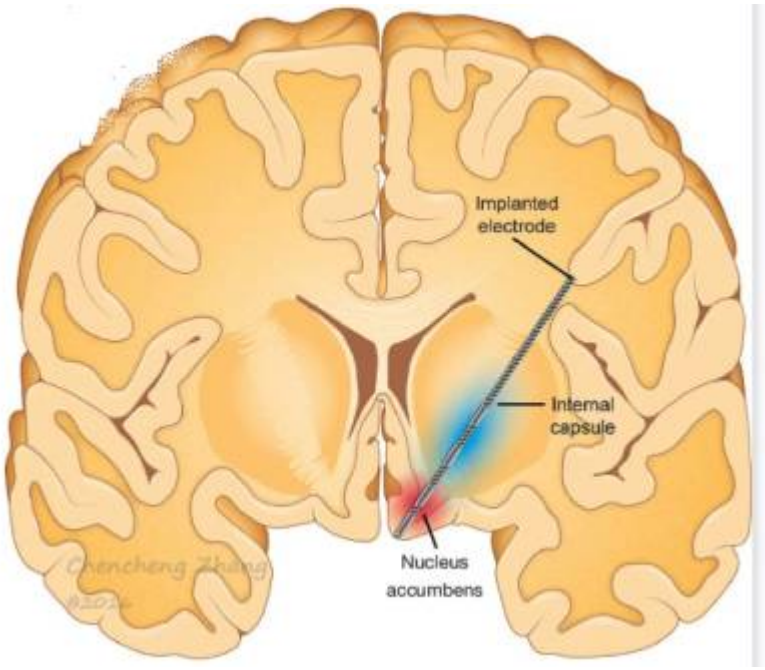
Nucleus accumbens deep brain stimulation



- Frequent Vocalizations and DBS-Responsive Hyperkinesia in a Striatal Disinhibition Rat Model for Tourette Syndrome
- Dual bilateral stimulation of the nucleus accumbens and the centromedian thalamus for treatment of intractable Tourette syndrome
- NAc-DBS selectively enhances memory updating without effect on retrieval
- Weight restoration in patients with anorexia nervosa after stereotactic surgery and brain morphometric insights
- The Targets of Deep Brain Stimulation in the Treatment of Treatment-Resistant Depression: A Review
- Nucleus accumbens deep brain stimulation in adult patients suffering from severe and enduring anorexia nervosa (STIMARS): protocol for a pilot study
- Mechanisms of nucleus accumbens deep brain stimulation in treating mental disorders
- Anaesthetic management of deep brain stimulation in obesity treatment: A case report

Indications

Sturm et al. choose the shell region of the right nucleus accumbens as a target for deep brain stimulation (DBS) in a pilot series of four patients with severe obsessive-compulsive disorder and anxiety disorders. A significant reduction in the severity of symptoms has been achieved in three of four patients treated. Clinical results as well as a 15-O-H(2)O-PET study, performed in one patient during stimulation, speak in favor of the following hypothesis. As a central relay structure between the amygdala, basal ganglia, mesolimbic dopaminergic areas, mediodorsal thalamus, and prefrontal cortex, the accumbens nucleus seems to play a modulatory role in information flow from the amygdaloid complex to the latter areas. If disturbed, imbalanced information flow from the amygdaloid complex could yield obsessive-compulsive- and anxiety disorders, which can be counteracted by blocking the information flow within the shell region of the accumbens nucleus by deep brain stimulation [1)].

Options for eating disorders are limited and new approaches are desired. An interesting approach is the application of deep brain stimulation (DBS). The nucleus accumbens (NAcc) is part of the food reward system. A pilot study reported that DBS of the NAcc shell modulates food intake and body weight in rats. Underlying mechanisms such as the food intake microstructure are unknown so far. Normal-weight female Sprague-Dawley rats were equipped with a custom-made DBS electrode placed unilaterally in the NAcc shell. Biphasic stimulation was performed for seven days. Body weight and food intake including the microstructure were assessed over the experimental period. Behavior was monitored manually. DBS tended to increase body weight gain (28.1 ± 5.4 g) compared to sham-stimulated controls (16.7 ± 3.4, $P = 0.05$) without affecting daily food intake ($P > 0.05$). Further analyses showed that light phase food intake was stimulated, whereas dark-phase food intake was decreased in the DBS group ($P < 0.05$). During the light phase bout frequency (+50%), bout duration (+64%), meal duration (+71%) and overall time spent in meals (+92%) were increased in DBS rats ($P < 0.05$), while during the dark phase no alterations were observed ($P > 0.05$). Behavior did not show differences regarding overall eating and drinking behavior (including food/water approach), grooming or locomotion ($P > 0.05$). Summarized, although overall food intake was not changed by DBS, light phase food intake was stimulated likely via a reduction of satiation [2)].

The use of DBS in treatment-resistant anorexia nervosa should be evaluated in carefully designed, early-phase feasibility trials [3)].

Results of a study revealed that ablation of the NAc can increase the anorexia nervosa (AN) patients' physiological drive to eat. Furthermore, there were no severe and/or life-influencing complications associated with the treatment [4)].

Nucleus accumbens deep brain stimulation for major depressive disorder

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Deep brain stimulation of the nucleus accumbens for alcohol use disorder

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Deep brain stimulation of the nucleus accumbens for eating disorder

Deep brain stimulation of the nucleus accumbens for eating disorder.

Case reports

A 42-year-old Autistic lady suffering from OCD and aggression was offered Deep brain stimulation of the nucleus accumbens (NAc DBS) for her comorbidities of OCD and aggression. NAc was targeted using standard stereotactic methods and the postoperative scans confirmed the position of the active electrode to be within the NAc. The patient had significant relief of her symptoms. At a one-year follow-up the Yale-Brown obsessive-compulsive scale (YBOCS) score for OCD, excluding items 1-5 of YBOCS, improved from 19 to 5. Her Hamilton depression and anxiety scores similarly improved from 20 to 15 and from 30 to 18. Social communication questionnaire - current autism score improved from 26 to 16, the subscores for reciprocal social interaction improved from 13 to 8, for communication from 5 to 4, and for the restricted, repetitive and stereotyped patterns of behavior 6 to 3.

This case reports illustrates the role of NAc in OCD and aggression in an autistic patient [5].

1)
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5)
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