Subthalamic nucleus function

The voluntary nature of decision-making is fundamental to human behavior. The subthalamic nucleus is important in reactive decision-making, but its role in voluntary decision-making remains unclear.

The primary function of the subthalamic nucleus is movement regulation along with the rest of the basal ganglia. The majority of the neurons arising from the subthalamic nucleus are excitatory Glutamatergic neurons and project to the internal globus pallidus.

Current theories place it as a basal ganglia control system component that may perform action selection. STN dysfunction has also increased impulsivity in individuals with two equally rewarding stimuli.

Research has suggested that the subthalamus is an extrapyramidal center. It holds muscular responses in check, and damage may result in hemiballismus (a violent flinging of the arm and leg on one side of the body).

Findings highlight a role for the left STN in reward and loss processing and a potential role in addictive behaviors. These findings emphasize the cognitive-limbic function of the STN and its role as a physiologic target for neuropsychiatric disorders [1].

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Manssuer L, Wang L, Ding Q, Li J, Zhang Y, Zhang C, Hallett M, Li D, Sun B, Voon V. Subthalamic Oscillatory Activity of Reward and Loss Processing Using the Monetary Incentive Delay Task in Parkinson Disease. Neuromodulation. 2022 May 12:S1094-7159(22)00629-8. doi: 10.1016/j.neurom.2022.04.033. Epub ahead of print. PMID: 35570149.