Monoaminergic neurotransmitter systems underlie therapeutic and side effects of deep brain stimulation

MONOAMINERGIC NEUROTRANSMITTER SYSTEMS UNDERLIE THERAPEUTIC AND SIDE EFFECTS OF DEEP BRAIN STIMULATION

1- The monoaminergic neurotransmitter systems play a crucial role in the therapeutic effects and the side effects of deep brain stimulation (DBS) in Parkinson's disease (PD). [Thesis]

2- High frequency stimulation of the subthalamic nucleus (HFS-STN) inhibits serotonergic neurons, induces mood-related adverse effects and changes in the serotonergic cell phenotype, indicating neuroplastic effects of DBS. [Thesis]

3- Optogenetic and chemogenetic approaches, along with transgenic animal models, provide valuable tools to assess the mechanistic effects of DBS on local and distant neural components. [Thesis]

4- HFS-STN indirectly connected to the dorsal raphe nucleus may not involve the relay by the globus pallidus externa. [Thesis]

5- HFS-STN improving motor symptoms in Parkinson's may not be related to the cholinergic system.

6- The cost and complications associated with invasive DBS surgery procedures necessitate developing of less invasive alternatives. [Thesis]

7- Magnetoelectric stimulation of the subthalamic nucleus using magnetoelectric nanoparticles shows potential as a noninvasive neuromodulation approach, although further research is needed to optimize this technology and address associated challenges. [Thesis]

8- Improving the DBS technology can have a positive impact not only on the symptoms of PD patients but also on their quality of life and daily activities, as well as the feasibility of DBS treatment.

9- "Whoever takes a path upon which to obtain knowledge, Allah makes the path to Paradise easy for them." *Prophet Mohammed*

10- "This world is grand, and within it lies an ocean of undiscovered findings. " *Isaac Newton*

11- "I don't have any choice whether or not I have Parkinson's, but within that lack of choice, there are a million other choices I can make." *Michael J. Fox*