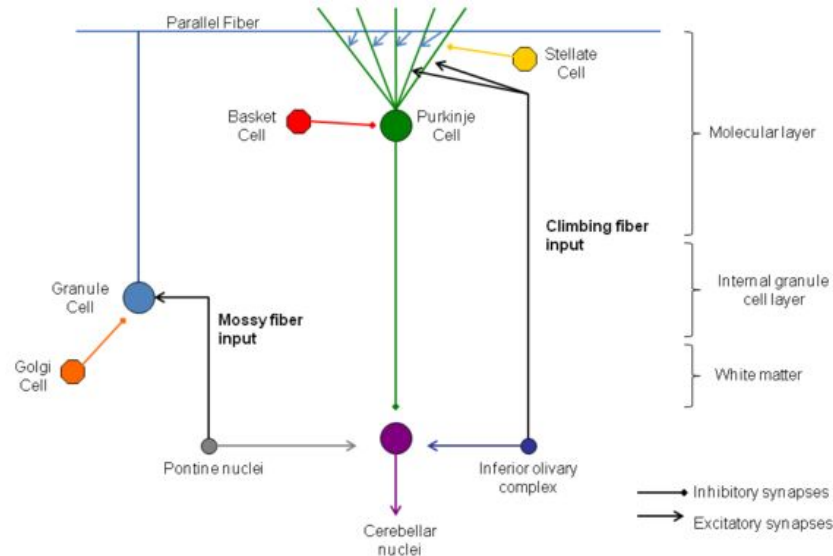


Pathways in the Brain

Biology Part 2

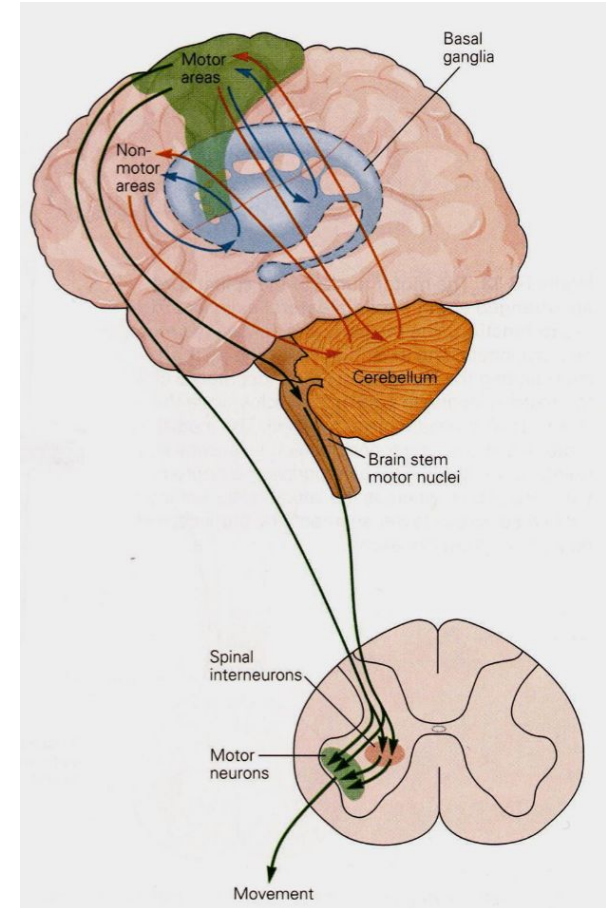
What are pathways?

- A **neural pathway** is the connection formed by axons that project from neurons to make synapses onto neurons in another location, to enable a signal to be sent from one region of the nervous system to another. Neurons are connected by a single axon, or by a bundle of axons known as a nerve tract or fasciculus. (Moore and Dalley)

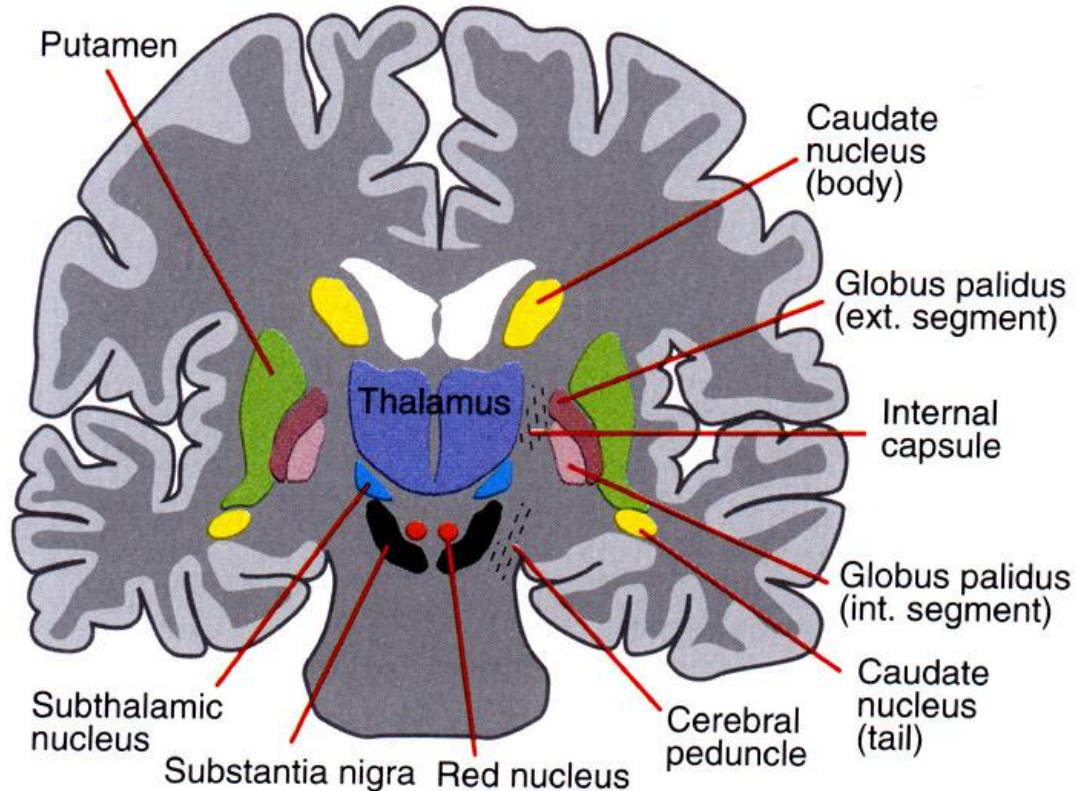


Motor Systems

- Primary Motor System: cortex, brainstem and spinal cord.
 - Execute motor functions
 - Paralysis
- Cerebellum and Basal Ganglia
 - “Side loops”
 - Modulate primary motor system
 - Rigidity/ Involuntary movement/ Immobility without paralysis

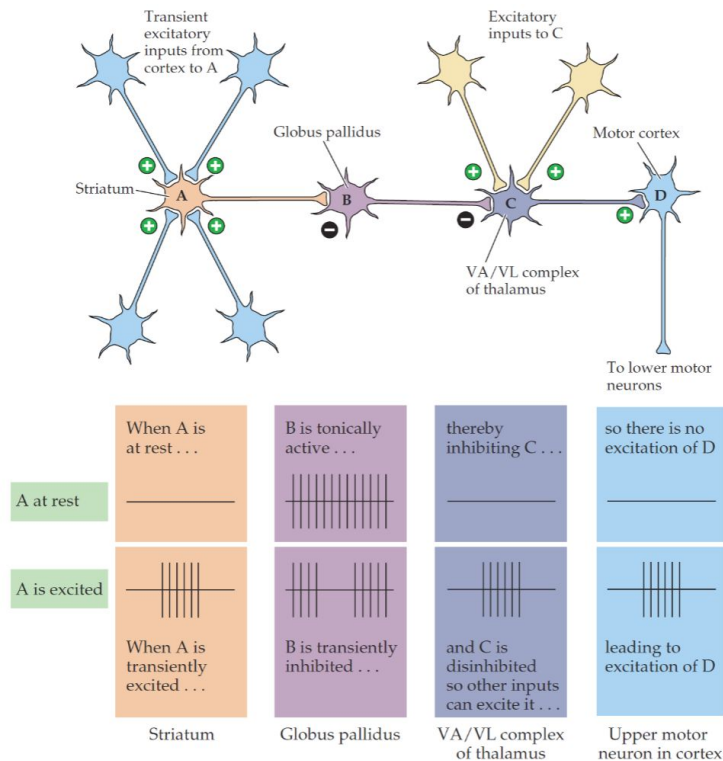


Basal Ganglia Anatomy Review



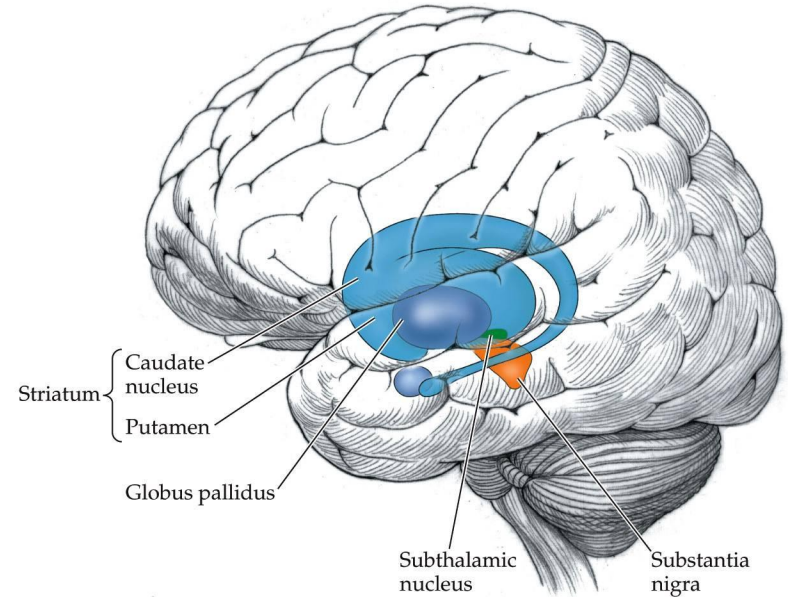
The Globus Pallidus

- A two part basal ganglia structure
 - Internal and External
- Input from striatum
- Output to thalamus and substantia nigra
- **ROLE:** Regulation of voluntary movement



Striatum (Neostriatum)

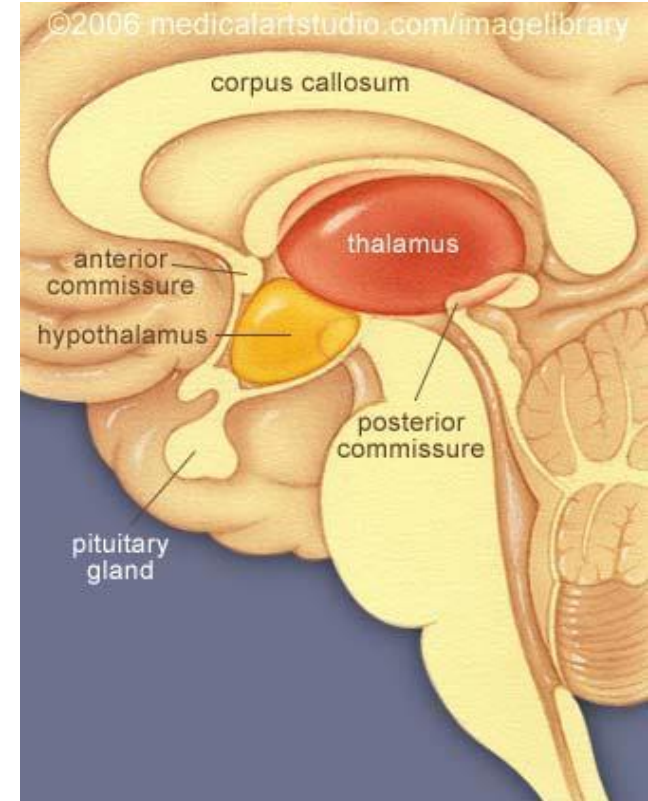
- The striatum is a component of the motor and reward system. It receives glutamatergic and **dopaminergic** input from different sources; **serves as primary input to basal ganglia**.
 - Caudate nucleus and Putamen make the Striatum
- **Medium Spiny Neuron (MSN)**: Principle neurons of the Striatum
- Input - Cortex
- Output - Globus Pallidus and Substantia Nigra



Biological Psychology 6e, Figure 11.18

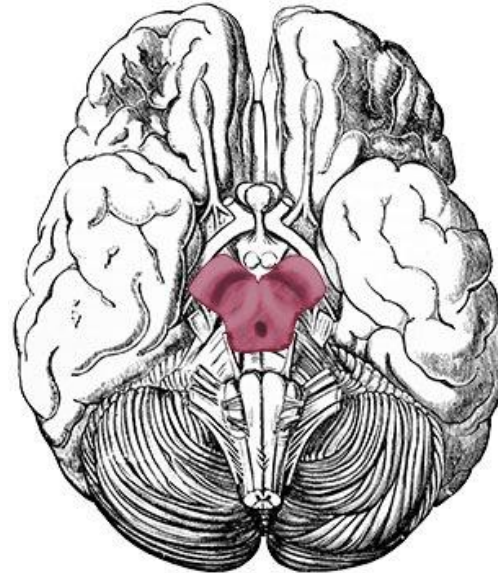
Thalamus

- Main relay station, sensory signals, **motor signals**
- Input - Globus Pallidus and Substantia Nigra
- Output - Cortex

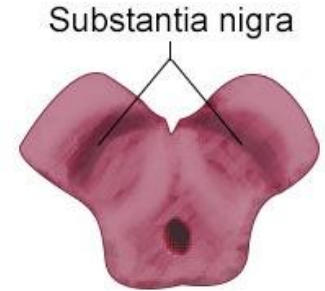


Substantia nigra

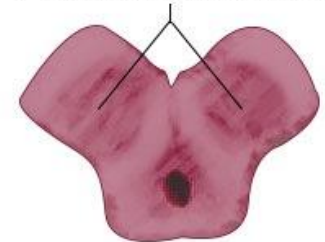
- Plays a role in reward and **movement**
- House of dopamine neurons
- Input - Striatum
- Output - Thalamus



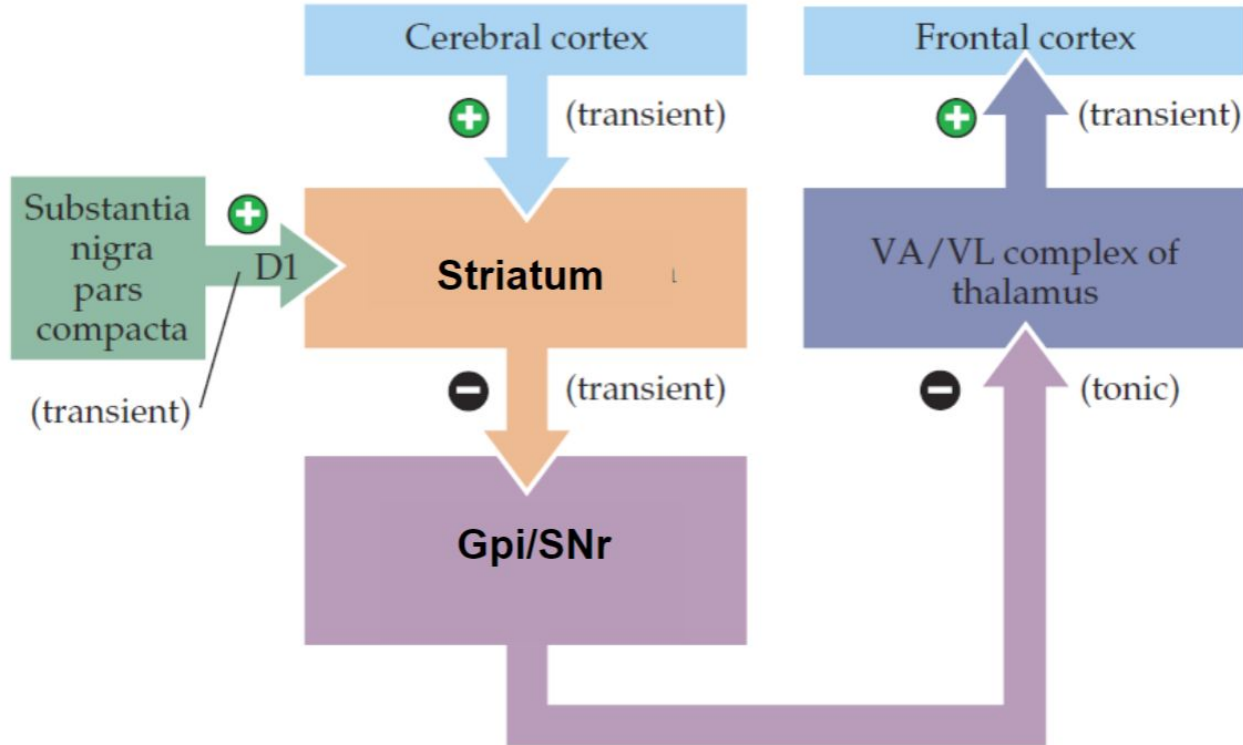
Cut section of the midbrain
where a portion of the
substantia nigra is visible



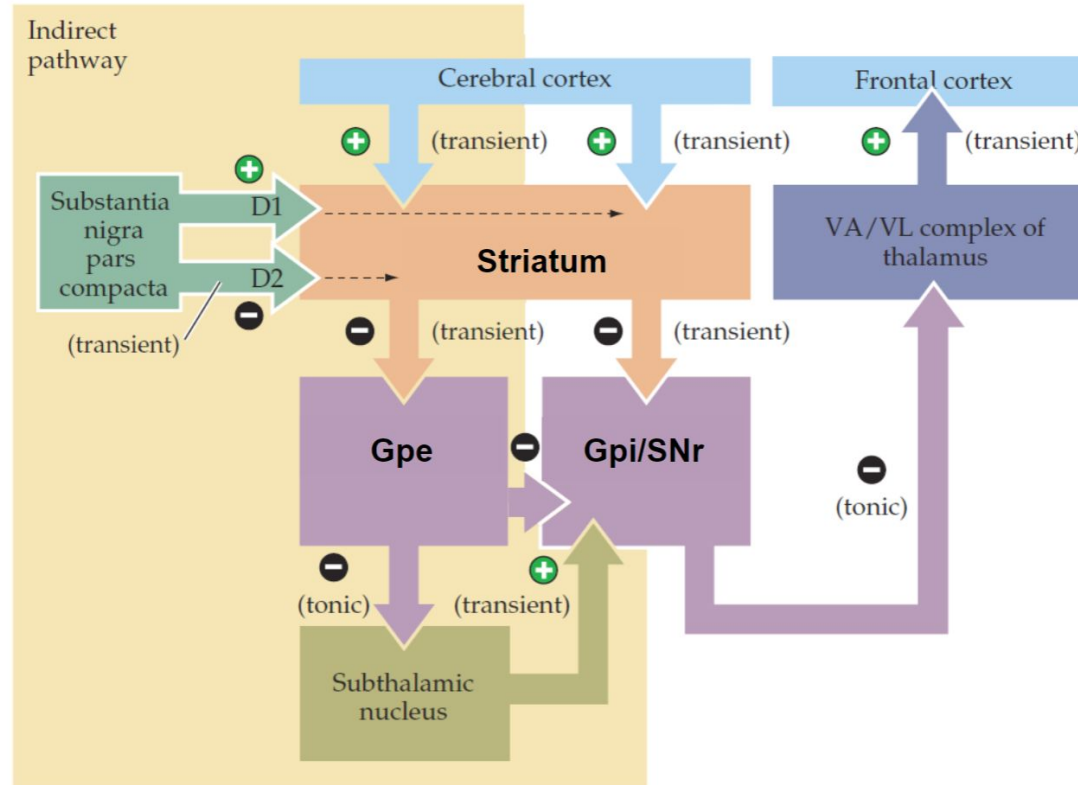
Reduced substantia
nigra as visible in
Parkinson's disease



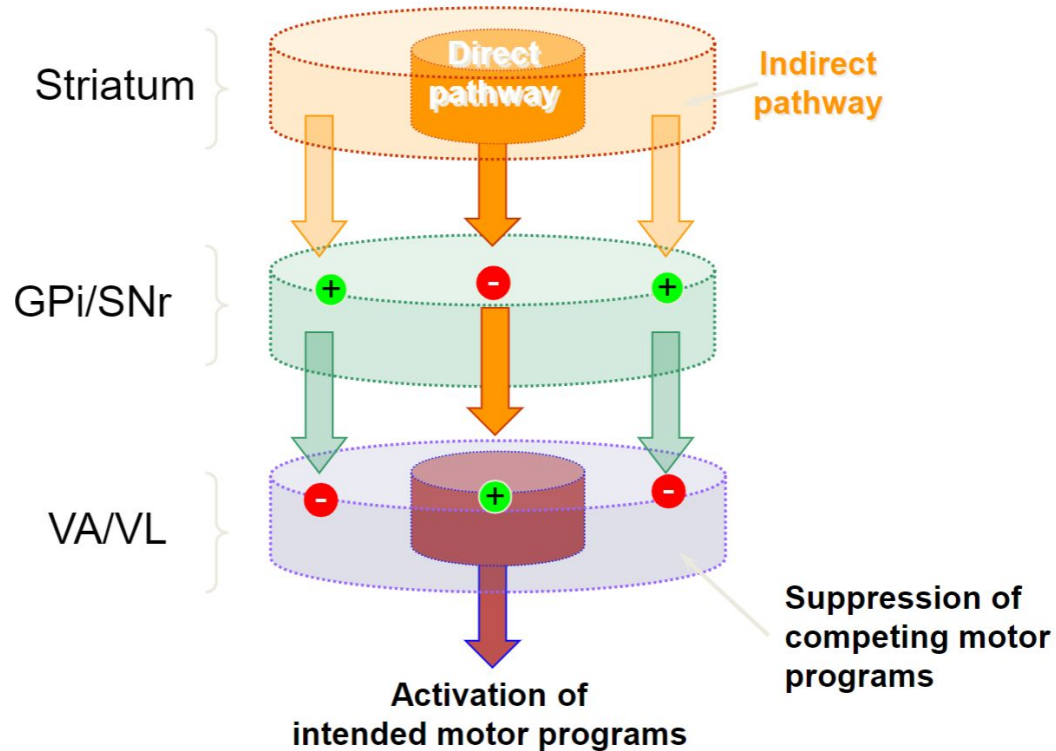
Direct Pathway



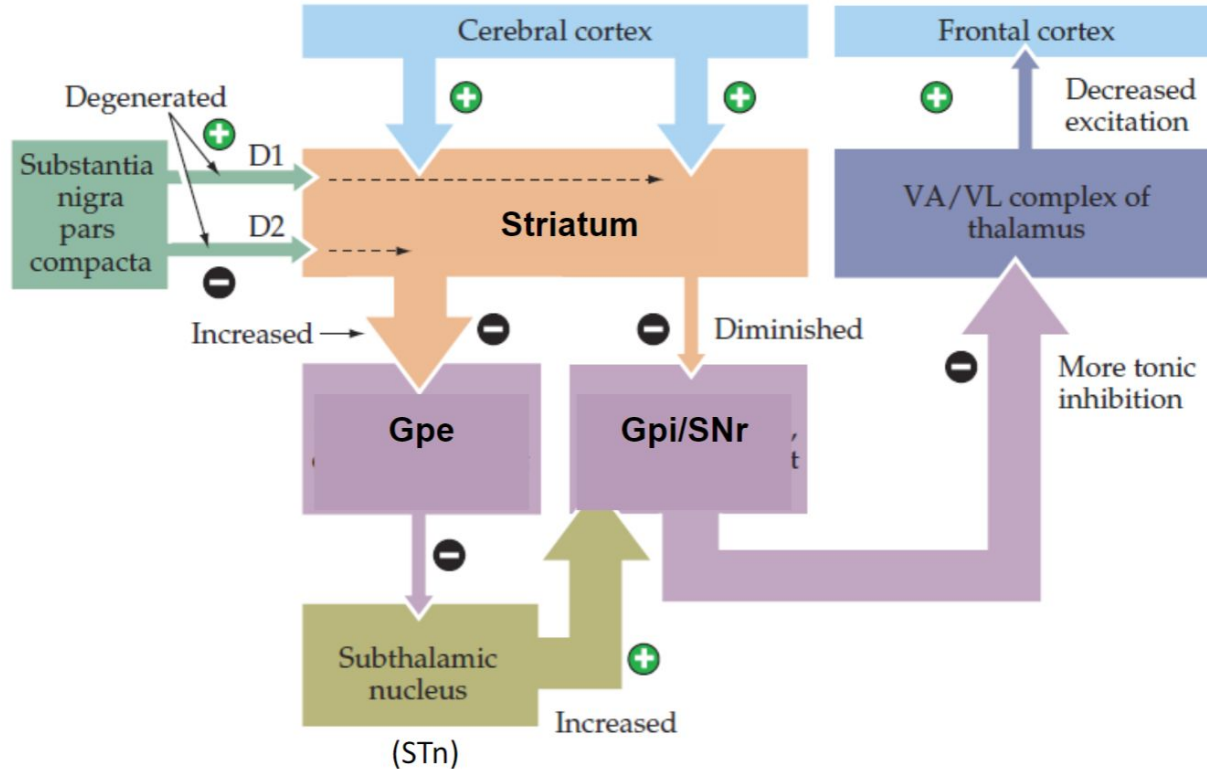
Indirect Pathway



Indirect and Direct Pathway



Parkinson's Pathways



Link to watch for Homework

- <https://www.khanacademy.org/science/health-and-medicine/nervous-system-diseases/parkinsons-disease/v/the-basal-ganglia-the-direct-pathway>
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