

## Deep Cerebral Nuclei ("Basal Ganglia")

• caudate - head, body, tail (lies next to ventricle)

• putamen -

• globus pallidus - medial to putamen (has internal + external part)

• claustrum

• amygdala

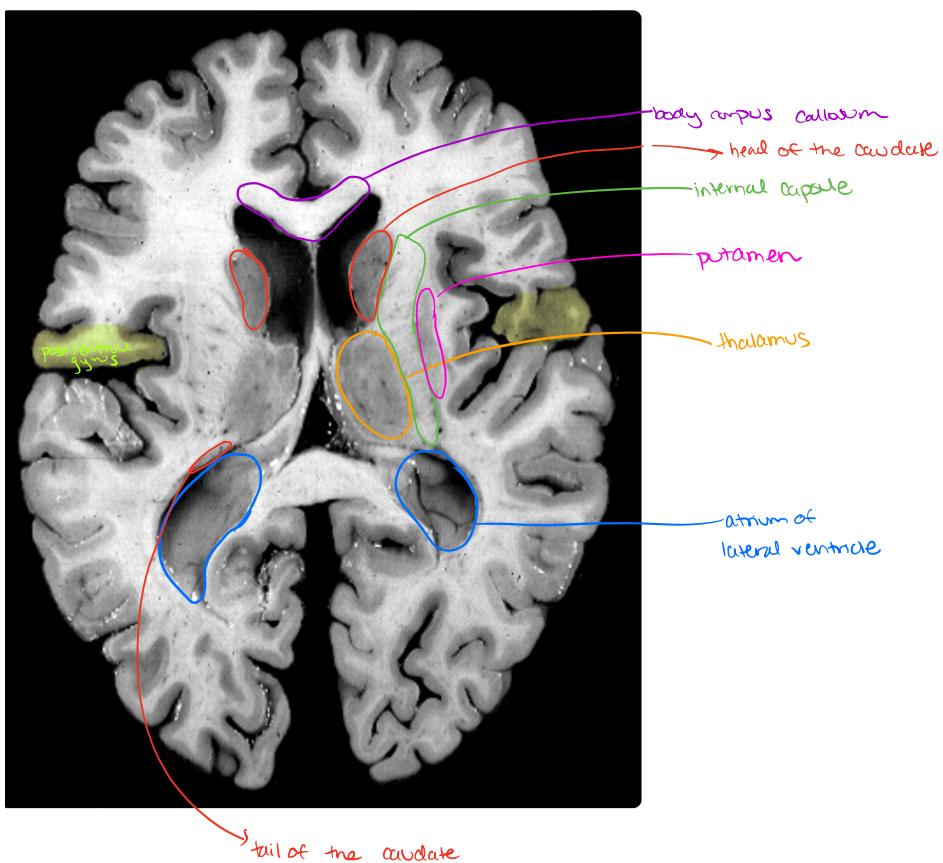
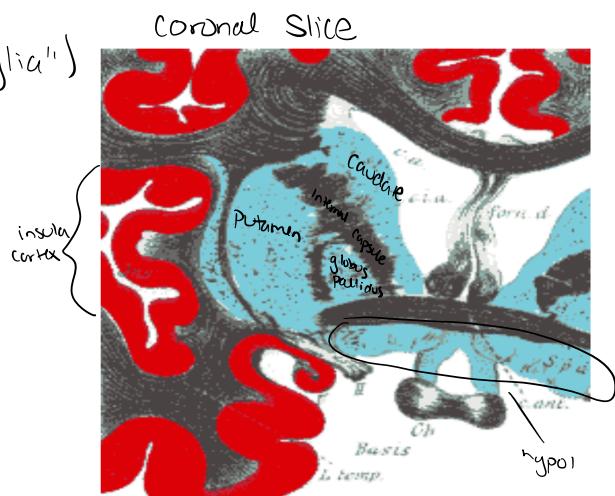
• accumbens

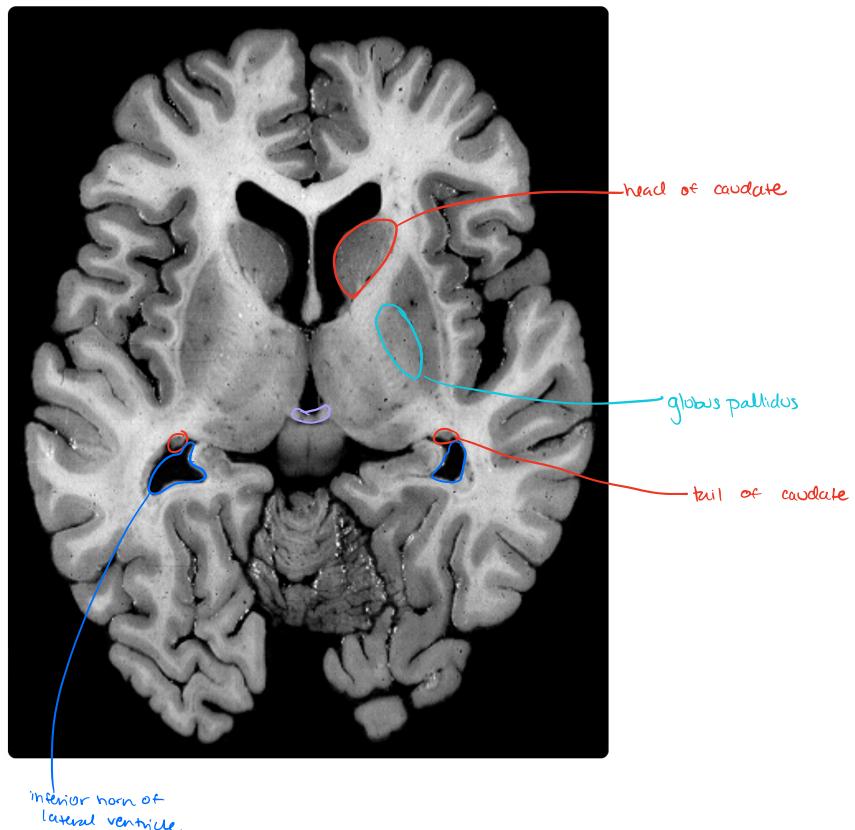
### Capsules

• internal capsule — anterior limb, posterior limb, genu

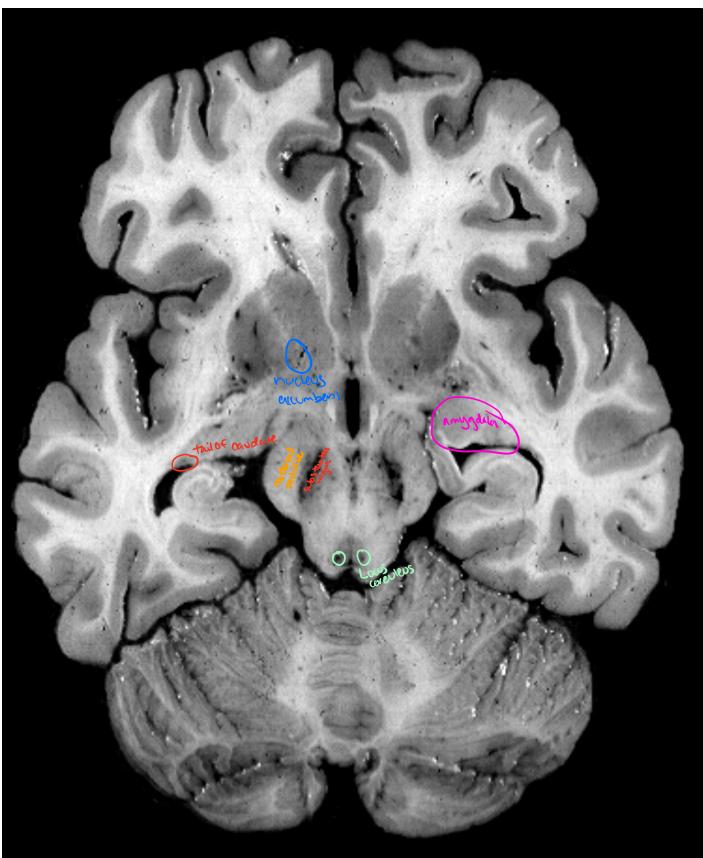
• external capsule

• extreme capsule





inferior horn of  
lateral ventricle



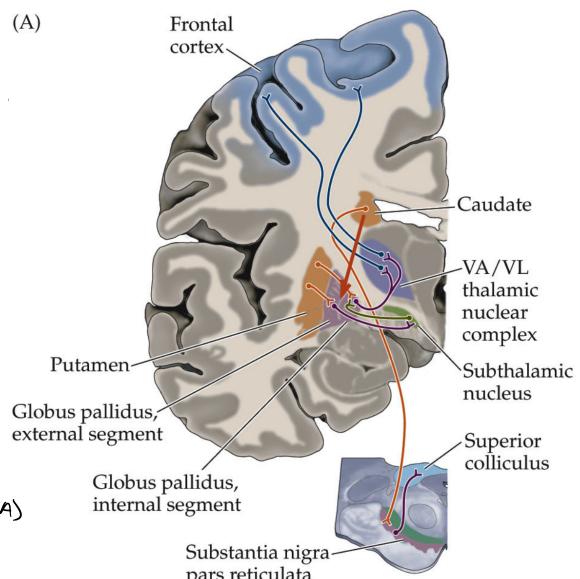
- CORPUS STRIATUM - mainly caudate + some putamen → striped by internal capsule fibers
- neostriatum - caudate, putamen, nucleus accumbens
  - "neol" → phylogenetically new
- paleostriatum - globus pallidus
- archistriatum - amygdala
- lenticular nuclei

## Inputs to Deep Cerebral Nuclei

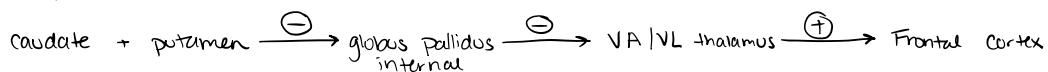
- Cerebral Cortex - almost all of the cortex projects to basal ganglia except primary visual/auditory
- Brainstem - substantia nigra pars compacta and raphe nuclei
- Thalamus - midline and intralaminar thalamic nuclei (not VA/VL of motor thalamus)
- main target of input is the striatum

## Striatal Outputs

- putamen + caudate of the neostriatum project to
  - internal + external parts of globus pallidus
- globus pallidus projects to motor control areas
  - internal globus pallidus to VA/VL thalamic nuclei
  - external globus pallidus to subthalamic nucleus
    - subthalamic nucleus projects back to internal globus pallidus
- Caudate also projects to substantia nigra pars compacta (non-dopamine producing midbrain region)
- all neostriatal and globus pallidus projections are inhibitory (GABA)
- striatal motor outputs are classified as direct or indirect



## Direct projections to Motor Cortex



- all connections are inhibitory except the thalamus to cortex
- activation of direct projection means activation of caudate + putamen results in increased motor cortex activation
- dopamine is what excites the direct neostriatum (D1 receptors)
  - loss of activation of the direct projection system by dopamine produces hypokinesia



