Neuroscience BIO-311 - Ramdya

Exercise for: Movement control by motor cortex and basal ganglia

1) **Make a rough drawing of the left human cortex. Indicate the positions of the somatosensory, visual and auditory primary cortices. Add the primary motor cortex and the premotor cortex. Indicate also the following regions: temporal lobe, frontal lobe, parietal lobe, occipital lobe.**

2) Recapitulate the principal anatomy of the lateral corticospinal tract (include a drawing). What are lower and upper motor neurons? Indicate the typical location of their cell bodies in the drawing.

3) i) Explain how the motor somatotopic maps are made. ii) Does the brain explicitly control single muscles, or does it control complex movements?

4) Taking inspiration from the example of Neuralink

(seen this week), how would you proceed if you wanted to allow a patient to control a robotic arm after they lost their own (following an accident for instance). Which signal would you acquire and how would you do it? How would you process and communicate it?

5) i) Describe the indirect and direct pathways in the Basal Ganglia and how they differ. ii) Which structures are "input" and "output" structures? iii) State which neurotransmitter is used by the principal neurons in the BG brain structures.

6) Explain how the perturbation of the basal ganglia circuits result in hypokinetic or hyperkinetic activity in the examples of Parkinson's and Huntington's diseases.