



Cortical and Corticostriatal Axonal Plasticity After Middle Cerebral Artery Occlusion

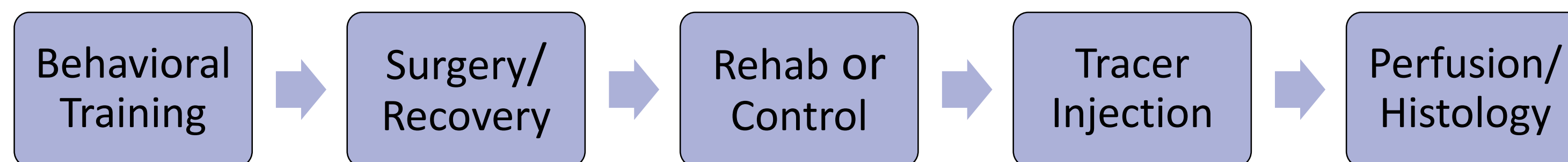
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Background

- Strokes usually damage one cerebral hemisphere, resulting in lateralized functional impairments.
- Middle cerebral artery occlusion (MCAo) is the most common cause of ischemic stroke in humans.
- Corticostriatal axonal projections, often damaged in MCAo, relay information from the cortex to the striatum, which relays input to the basal ganglia. Corticostriatal axons are known to exhibit a plastic response after ischemia
- Stroke recovery has a complicated timeline and can be influenced by factors such as physical rehabilitation.

Study Overview

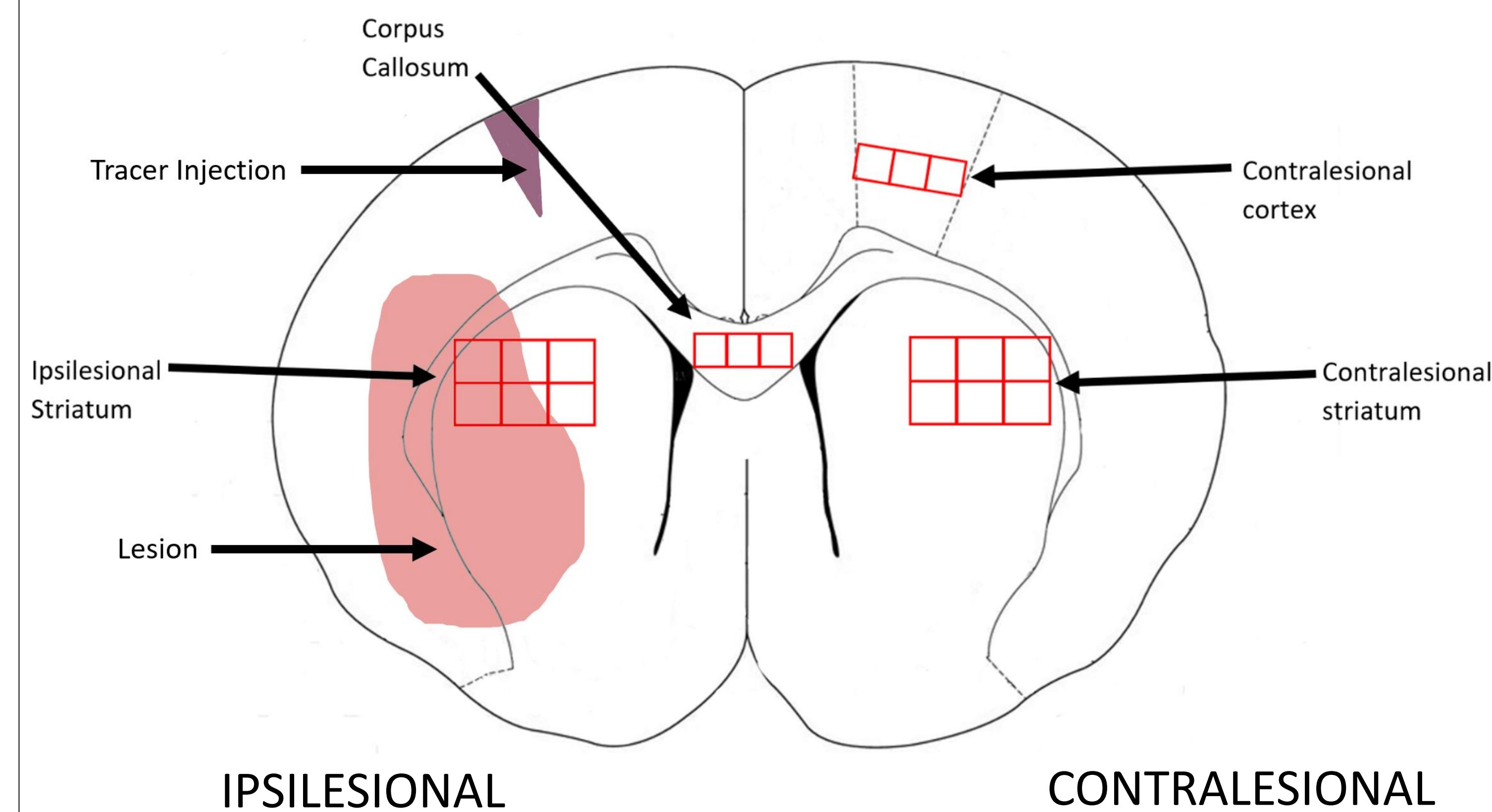
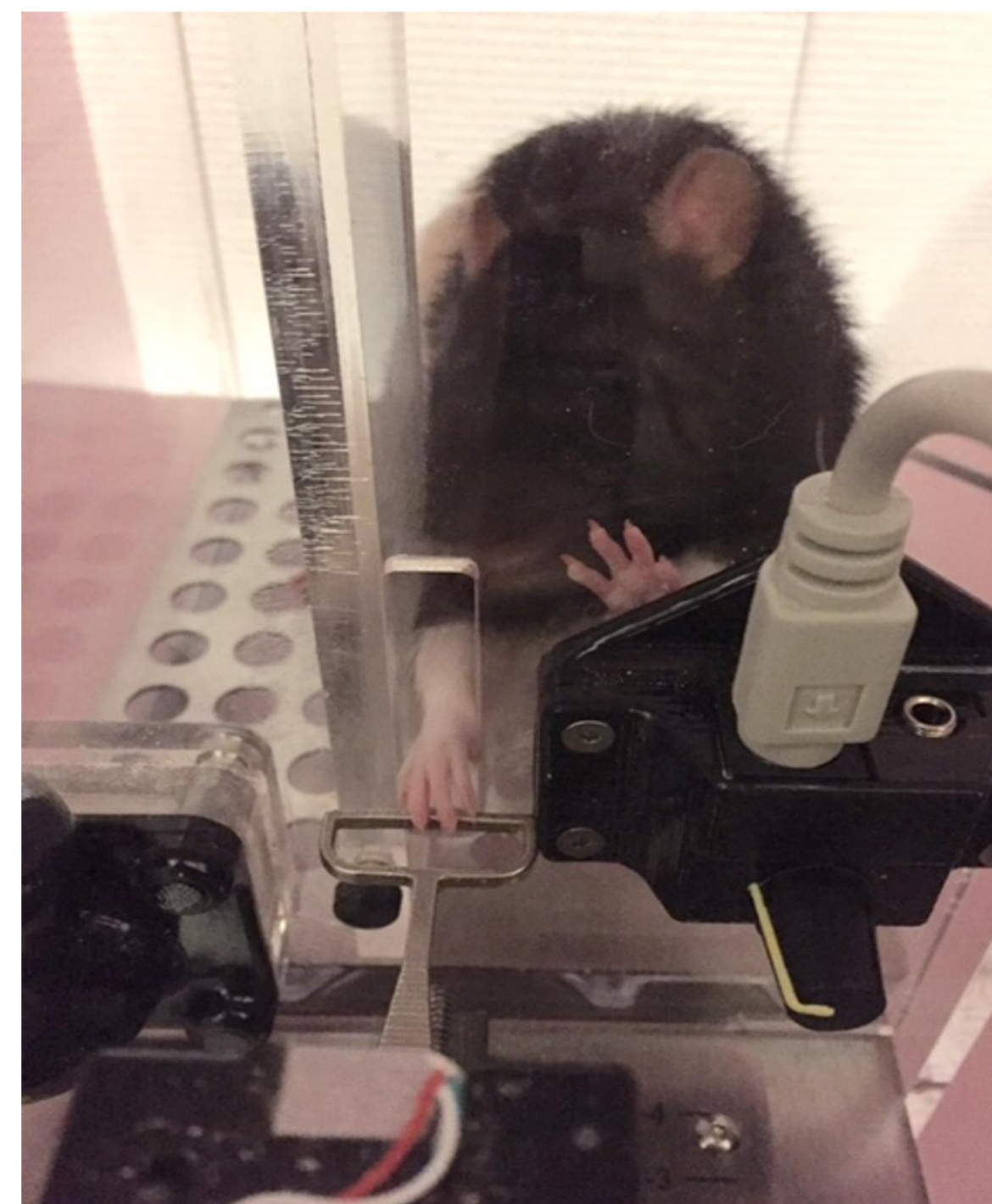


Standard Rehab

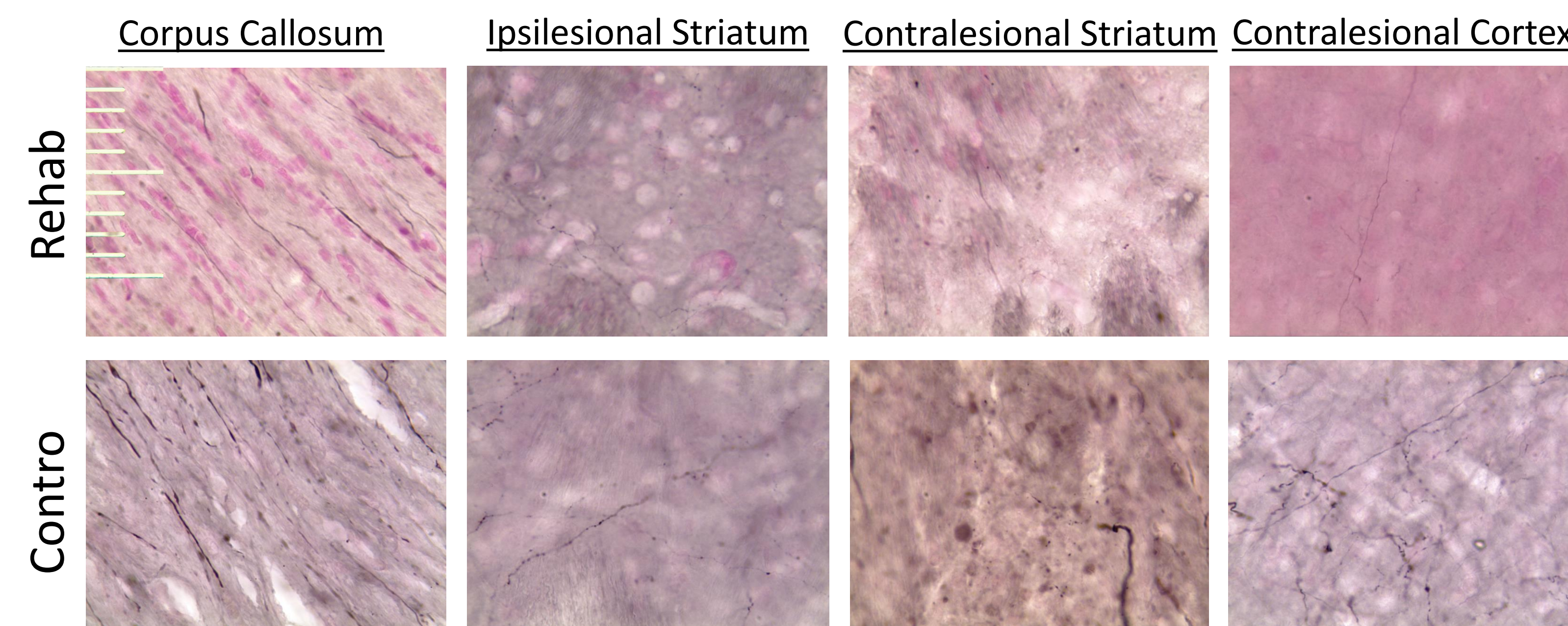
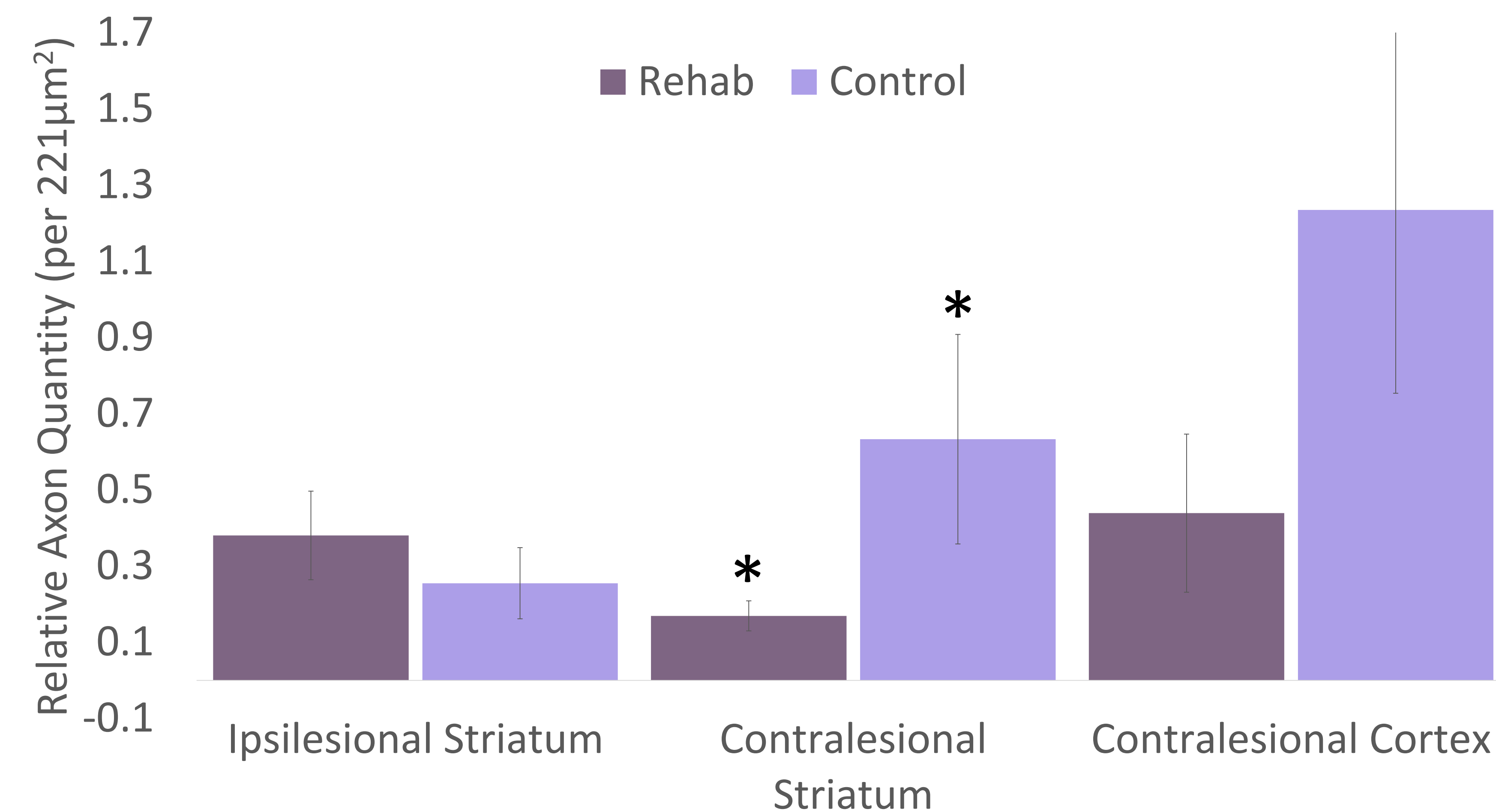
6 weeks reach training with the affected limb

Control

6 weeks of sessions in the training apparatus but with no reaching



Rehabilitative reach training reduces contralesional projections and tends to increase ipsilesional projections after middle cerebral artery occlusion



Photographs from each of the regions sampled were used to calculate relative axon quantity. Scale=.01mm

Conclusion

- Rehabilitative reach training reduced projections in the dorsolateral contralesional striatum in rats after MCAo compared to the control group.
- Rats who underwent rehabilitative reach training showed a non-significant increase in dorsolateral ipsilesional projections and a non-significant decrease in contralesional cortical projections compared to the control group.
- These results indicate that rehabilitative reach training shifts striatal projections to the ipsilesional striatum and suggests contralesional striatal growth may be compensatory.

Future Directions

- A larger sample size could be used to further investigate the increased trend of ipsilesional projections after rehabilitative reach training.
- Non-paretic limb training and reach training were also investigated in an overarching study. Data from these groups will also be examined.

References:

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Riban, V., & Chesselet, M. F. (2006). Region-specific sprouting of crossed corticofugal fibers after unilateral cortical lesions in adult mice. *Experimental Neurology*, 197(2), 451–457

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Relationship between behavioral measures and projection quantity is inconclusive

