Understanding the changes occurring in the brain after cerebellar stroke

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Why study cerebellar stroke?

Stroke: disease that occurs when there is loss of blood supply to the brain

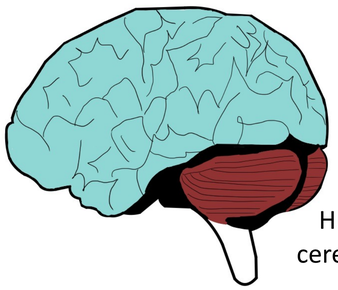
87% of strokes are ischemic

Brain cells die without oxygen.

Normal

Clot is blocking blood flow.

3-6% of strokes occur in the cerebellum

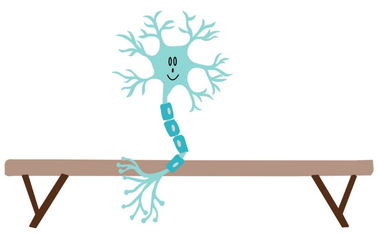


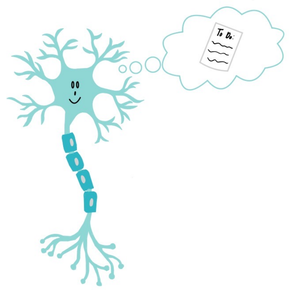
Human cerebellum

The cerebellum is a region of the brain responsible for:

Motor function (balance, coordination, fine movement)

Nonmotor function (cognition, executive function)





Clearly a deficit in the cerebellum can be quite taxing on an individual's daily functioning

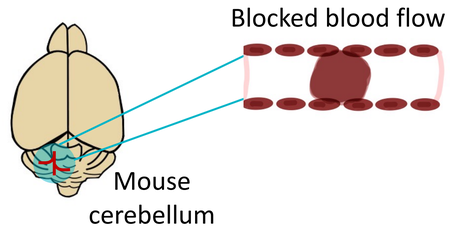
Approach

Animal research:

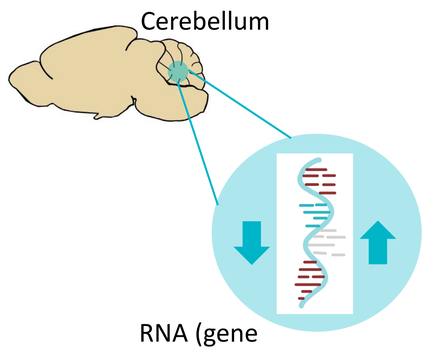
- Rodents can model our human disease of interest
- Provides opportunity to inhibit or reverse disease progression
- We follow IACUC and OLAR protocols to ensure proper animal care

Surgical model:

- Blood flow is blocked by targeting an artery in the cerebellum with light
- We always have control animals (shams) for data comparison

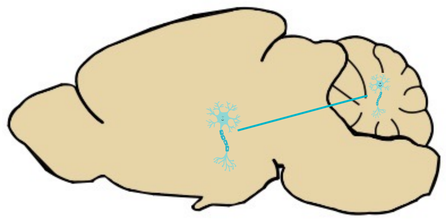


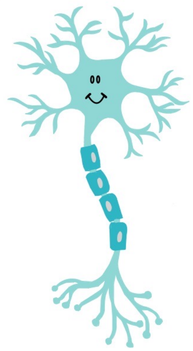
Current projects



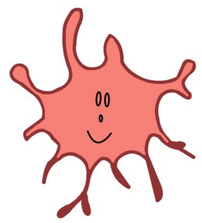
Coding to create visualizations of data

Communication from the cerebellum to other brain regions after stroke



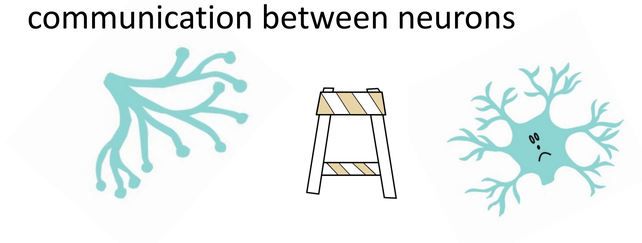


Interactions between neurons and other types of cells after cerebellar stroke

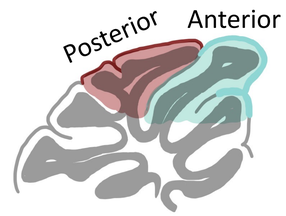


Conclusions

- After ischemic stroke, there may be changes in cellular structure that is affecting the communication between neurons



- Gene expression is related to the region where the blood flow was blocked in the cerebellum



- Stroke in the posterior part of the cerebellum appears to have a significant impact on the genes involved in electrochemical balance

Broader Impacts

- Preclinical research is crucial in understanding how different processes in the brain operate, which then creates targets for treatments
- Thousands of people are affected by brain diseases, and we need animal models to help their dysfunction
- It's important to keep scientific research funded so more creative experiments can be conducted
- Animal research is highly standardized with protocols that ensure safety of animals and eventually patients