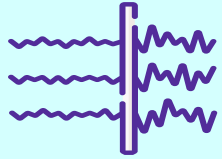
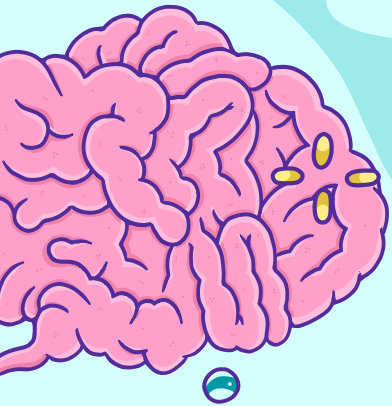


The Spontaneous Recovery Of Skilled Motor Functions Without A Primary Motor Cortex ✨

Omar Sohaib, Biology B.S

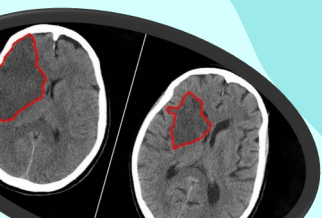
Dr. Adam Hantman, U.N.C School of Medicine, Neuroscience



How are animals able to recover from strokes but humans are not?

✦ When the brain's blood supply is cut off, a stroke develops. These locations experience cell damage and dysfunction. Few people entirely recover, and the majority still have some level of handicap.

✦ There have been previous studies done on apes that show spontaneous recovery of the affected area.



✦ Strokes remain one of the leading causes of adult disability.

✦ Understanding the stroke recovery mechanism can lead to a higher quality of life in patients who are prone to or experience strokes.

✦ Further fine tuning of stroke recovery pathways can give an insight into prevention of strokes.



Experiment and Result

Experiment: The reaching movement that allows us to pick up our cell phone from the table is isolated by the training of mice in a reach-to-grab assay.

Then the part responsible for reaching (motor cortex) is turned off by a laser which stimulates a stroke.

Eventually, a breakthrough happens in which mice are able to reach with the motor cortex turned off. This means these neurons are rewired to a different part of the brain.

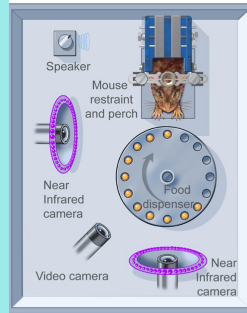


Figure 1: *Head-fixed Mice reach to grab assay*

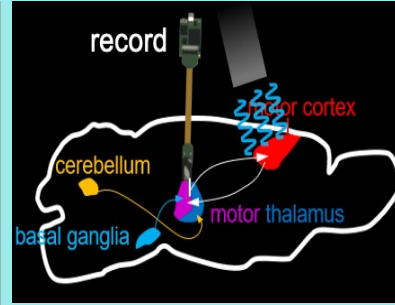


Figure 2: *Opto-inactivation of motor cortex in mice*

✦ This research gives insight into how stroke recovery works as well as open further questions regarding which part of the brain this information is being wired to.

Result:

The motor cortex inactivation observed is paradoxical. When low-intensity light is used on these mice we observe lingering activity in the motor cortex when a breakthrough occurs. However, in higher-intensity light perturbations, we observe no activity in the breakthrough indicating a complete rewiring of the motor cortex.

To investigate this rewiring, we will record the inputs of the motor cortex and surrounding brain areas to pin down where the activity is going. This will be done using a fMRI machine specialized for mice.