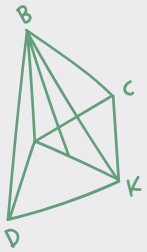
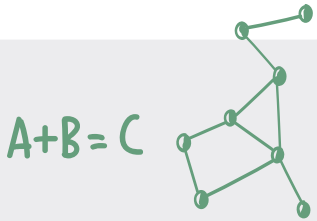


Effect of Caffeine on Stroke Incidence in Rats

Research question: How does the consumption of caffeine affect the likelihood of stroke in rats?

Hypothesis: Increased caffeine consumption in rats will lead to lower stroke rates



Before we start...

Background:

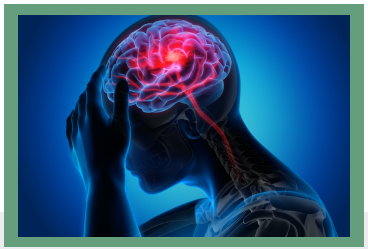
- Symptoms of stroke - convulsions, blindness, unresponsiveness, or irregular breathing
- Cause of stroke- blood clots in the brain/cerebral hemorrhage
- Caffeine - rich in antioxidants, nervous system stimulant, promotes blood circulation

Significance:

- Stroke is the leading cause of both death and long-term disability in the world
- 1 in 4 people over 25 will be hit by stroke

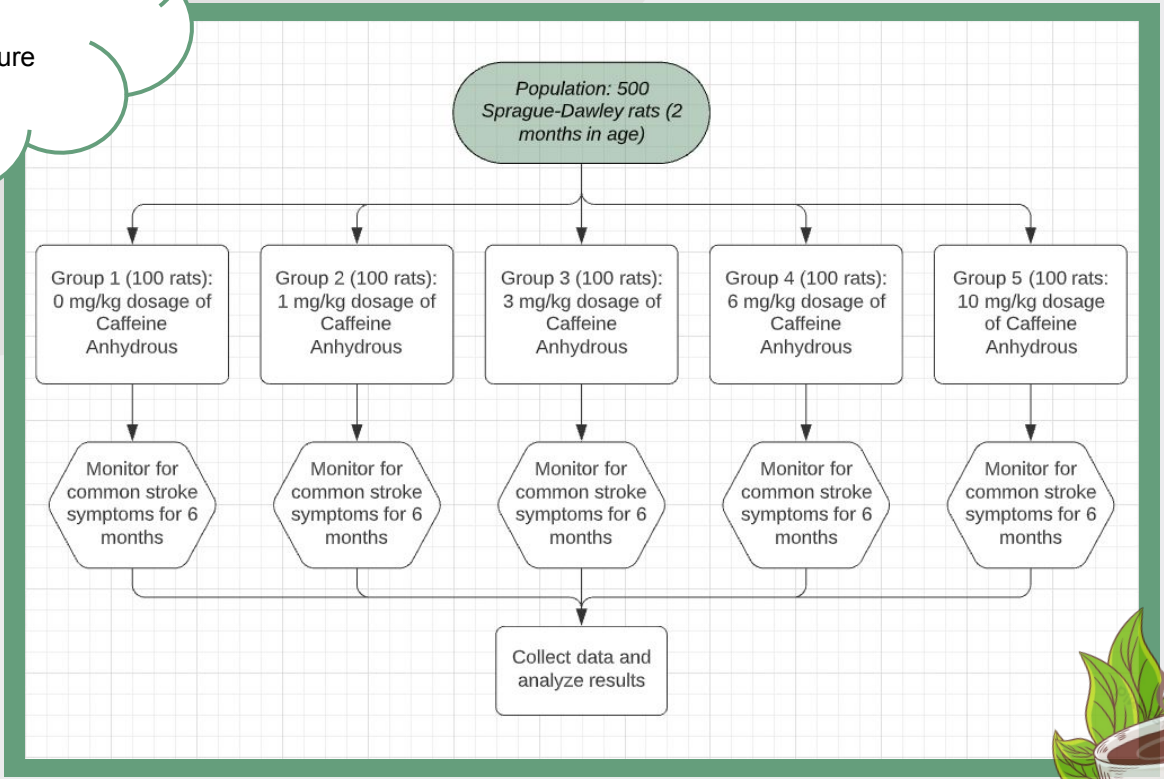
Rationale:

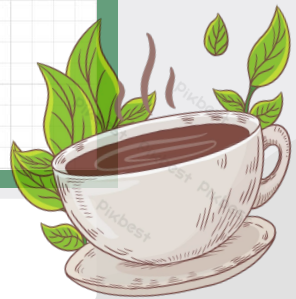
- There is no cure for strokes



Experimental Design

Controls:
- Meals
- Light
- Temperature
- Exercise





Note: the average person drinks 6 mg of caffeine per kg of their body weight every day

mNSS Explained

- Modified neurological severity scores:
  - Rates neurological functioning of rats on a scale of 14.
  - Includes a composite of motor, sensory, reflex, and balance tests
- Score analysis:
  - 1 ~ 4 = mild defects
  - **5 ~ 9 = moderate defects**
  - **10 ~ 14 = severe defects**

Figure 1. Cylinder Test

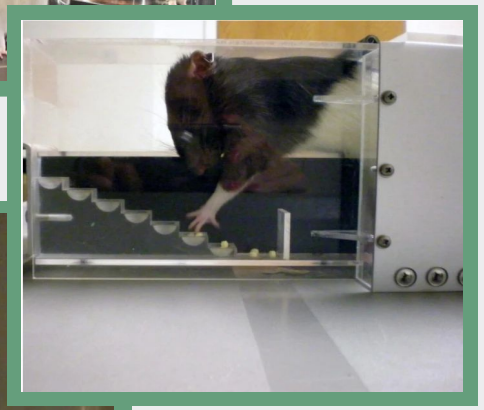


Figure 2. Staircase Test

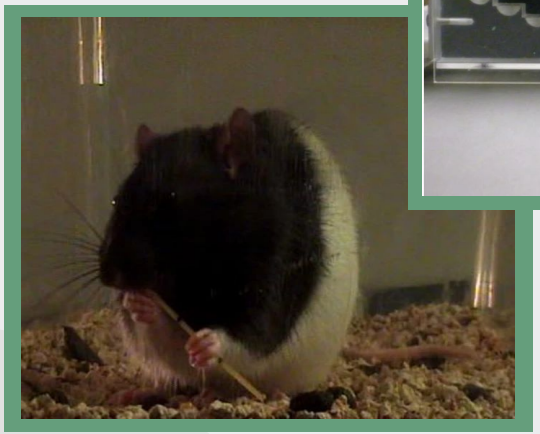
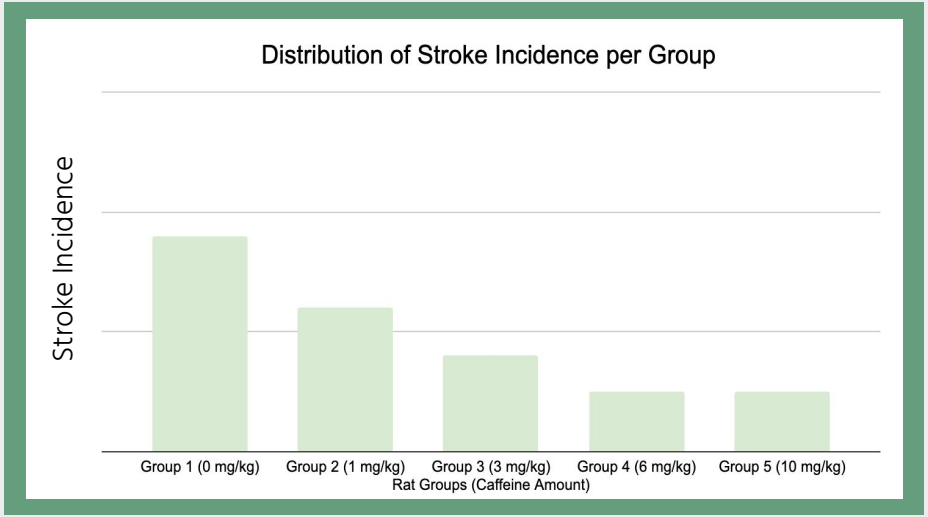


Figure 3. Pasta Test

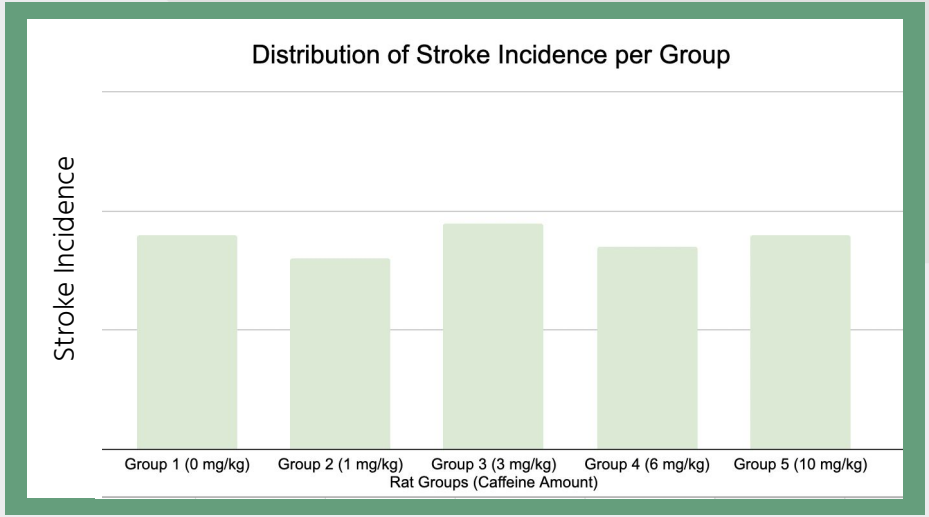
Potential Results

Supporting Hypothesis



- The experimental groups display significantly less incidences of stroke (p-value < 0.05)
- This can be explained by the study *Caffeine and Parkinson's Disease: Multiple Benefits and Emerging Mechanisms.*

Not Supporting Hypothesis



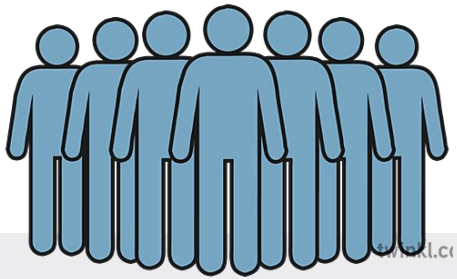
- No significant difference in stroke incidence across all experimental groups and control (p-value > 0.05)
- This can be explained by the study *Effects of habitual coffee consumption on cardiometabolic disease, cardiovascular health, and all-cause mortality*

Future Directions

Switch to human model

Next logical research question: *Do higher intake levels of caffeine reduce the likelihood of stroke in humans?*

- Provide set amounts of caffeine per experimental group
- Take into consideration extraneous variables (e.g. lifestyle habits, health history)



References

Kolahdouzan M, Hamadeh MJ. The neuroprotective effects of caffeine in neurodegenerative diseases. CNS Neurosci Ther. 2017 Apr;23(4):272-290. doi: 10.1111/cns.12684. PMID: 28317317; PMCID: PMC6492672.

O'Keefe JH, Bhatti SK, Patil HR, DiNicolantonio JJ, Lucan SC, Lavie CJ. Effects of habitual coffee consumption on cardiometabolic disease, cardiovascular health, and all-cause mortality. J Am Coll Cardiol. 2013 Sep 17;62(12):1043-1051. doi: 10.1016/j.jacc.2013.06.035. Epub 2013 Jul 17. PMID: 23871889.

Ren X, Chen JF. Caffeine and Parkinson's Disease: Multiple Benefits and Emerging Mechanisms. Front Neurosci. 2020 Dec 17;14:602697. doi: 10.3389/fnins.2020.602697. PMID: 33390888; PMCID: PMC7773776.

Schaar, K.L., Brenneman, M.M. & Savitz, S.I. Functional assessments in the rodent stroke model. *Exp & Trans Stroke Med* 2, 13 (2010). https://doi.org/10.1186/2040-7378-2-13

Zhang Y, Yang H, Li S, Li WD, Wang Y. Consumption of coffee and tea and risk of developing stroke, dementia, and poststroke dementia: A cohort study in the UK Biobank. PLoS Med. 2021 Nov 16;18(11):e1003830. doi: 10.1371/journal.pmed.1003830. PMID: 34784347; PMCID: PMC8594796.