Abstract

a. INVESTIGATING *MONODELPHIS DOMESTICA* AS AN ALTERNATIVE TO THE *MUS MUSCULUS* AS AN ANIMAL MODEL

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d. Background: Mus Musculus is one of the first and one of the most widely used animal models in current neuroscience literature (Phifer-Riley & Nachmann, 2015). However, the research community needs alternatives to rodent models to study the mammalian brain. Research is needed to see if antibodies that target tyrosine hydroxylase, which are well researched in mice, can also be used to study the *Monodelphis domestica* brain.

e. Objective: The *Monodelphis domestica* is a marsupial, their pups are born underdeveloped and easily accessible, and are thus excellent models for tracking neurodevelopment (Baggott & Moore, 1990). The objective of the present study is to consider the similarities and differences between the Mus Musculus and the *Monodelphis*.

f. Methods: Following transcardial perfusions and brain extractions, mouse and opossum brains were processed and stained for tyrosine hydroxylase (and with Nissl). Opossum brains will then be sliced and processed using IHC methods to compare two TH antibodies (EMD Millipore and Pelfreeze).

g. Results: Difference include that the *Monodelphis* has a much larger ventricle in the forebrain area and the mouse brain corpus callosum forms and fuses before the hippocampus compared to the opossum brain, where these fibers are formed more posterior to the formation of the hippocampus. The corpus callosum of the *Monodelphis* is also less prominent than the anterior commissure. The mouse hippocampus is well defined and begins formation after the formation of the corpus callosum, whereas *Monodelphis* hippocampus is not as defined. The results of the different antibodies will be available before the symposium.

h. Discussion: The difference in ventricular size could indicate densely packed neurons or less overall neurons in the *Monodelphis* compared with the mouse. In humans and the mouse brain, the majority of the nerve fibers are found in the corpus callosum as opposed to the anterior commissure; the opposite is true for the *Monodelphis*. The corpus callosum is an important feature that allows communication between both hemispheres of the brain. Considering that the hippocampus is implicated in memory and that the *Mus musculus* is a social animal, the more defined hippocampus could be an evolutionary

improvement for social interaction. The *Monodelphis* is a more territorial and isolated species, so their brains are presumably less adapted for social interactions.

i. Conclusions: Although there are differences between the mouse and the opossum brain, there are also many similarities. Further research is needed to determine what these differences could mean in behavior and cognition. Both EMD Millipore and Pelfreeze make TH antibodies that have been looked at in mice and replicated. More research is needed to determine if the antibodies can be used for other animals, including the *Monodelphis*.

j. Acknowledgements: We wish to thank Alejandro Reyes Canchola and the staff of the South Texas Diabetes Institute for their assistance with the *Monodelphis*. We also wish to thank Ismael Perez and the undergraduate students in the lab who have provided help and support with this project.

k. References:

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