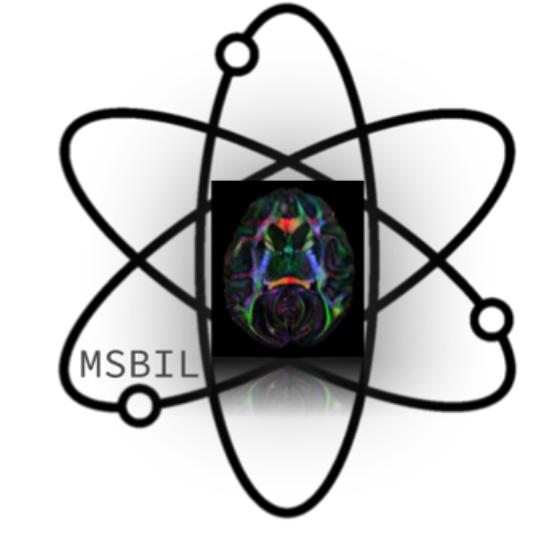


Scrutinizing the effects of normal aging on Bonnet Macaque's white matter

College of Pharmacy

A THE UNIVERSITY OF ARIZONA
KEYS Research Internship



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Abstract

To attain a better understanding of the development of dementia, we evaluated the structural integrity of white matter (WM) in post-mortem Bonnet macaque brains using MRI markers. WM is indicative of communication between brain areas. I developed a protocol to accurately select the WM region for 12 brains. We compared age (months) to multiple MRI markers within the WM regions. Initially, we hypothesized that the MRI maps, Fractional Anisotropy (FA), Bound Pool Fraction (BPF), and Myelin Water Fraction (MWF) would decrease as a result of aging. However, after analysis, no significant correlation between age and MRI metrics that would be indicative of degradation in WM was found. Based on our observations, the structural integrity of white matter appears to remain unchanged with respect to normal aging.

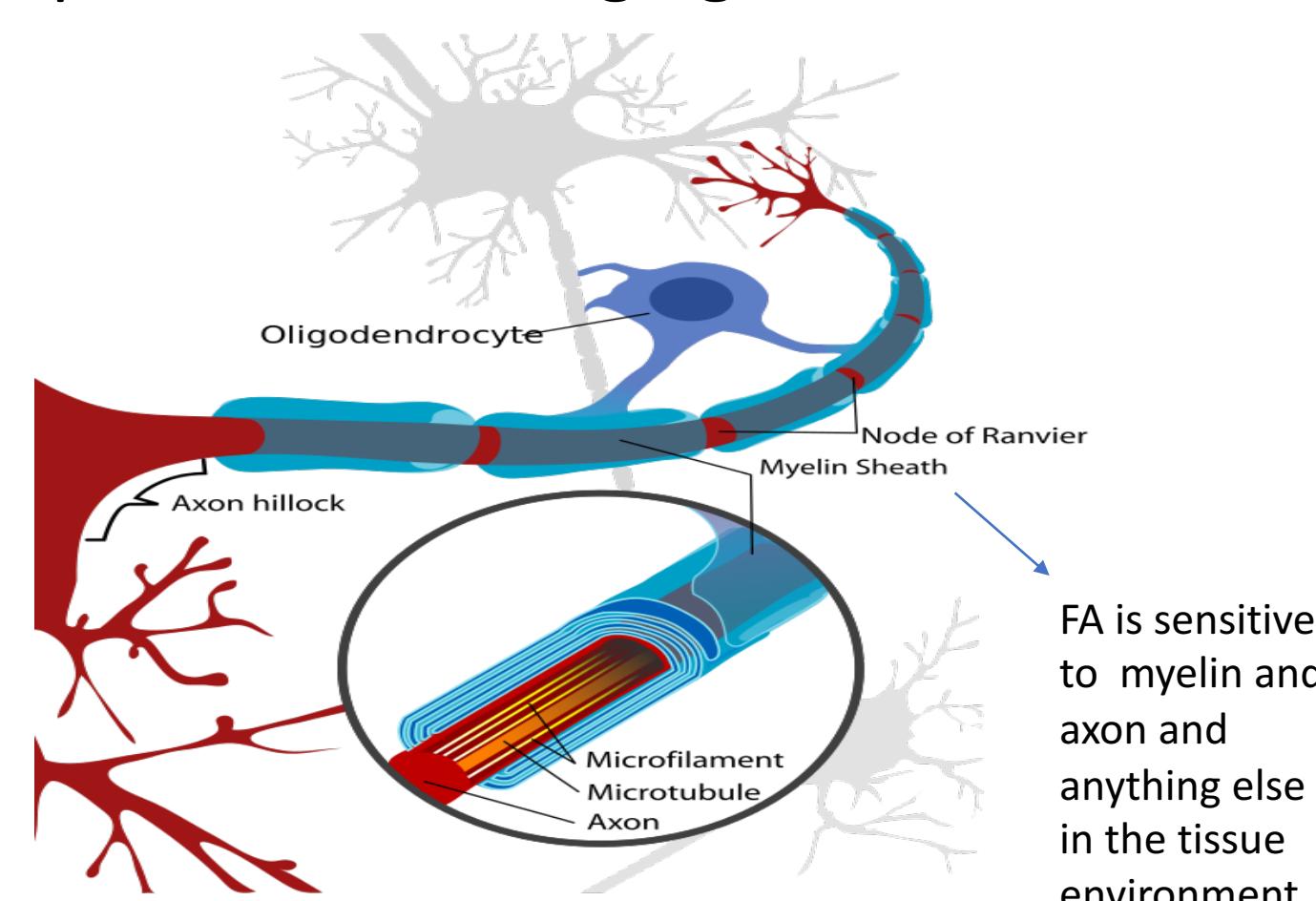
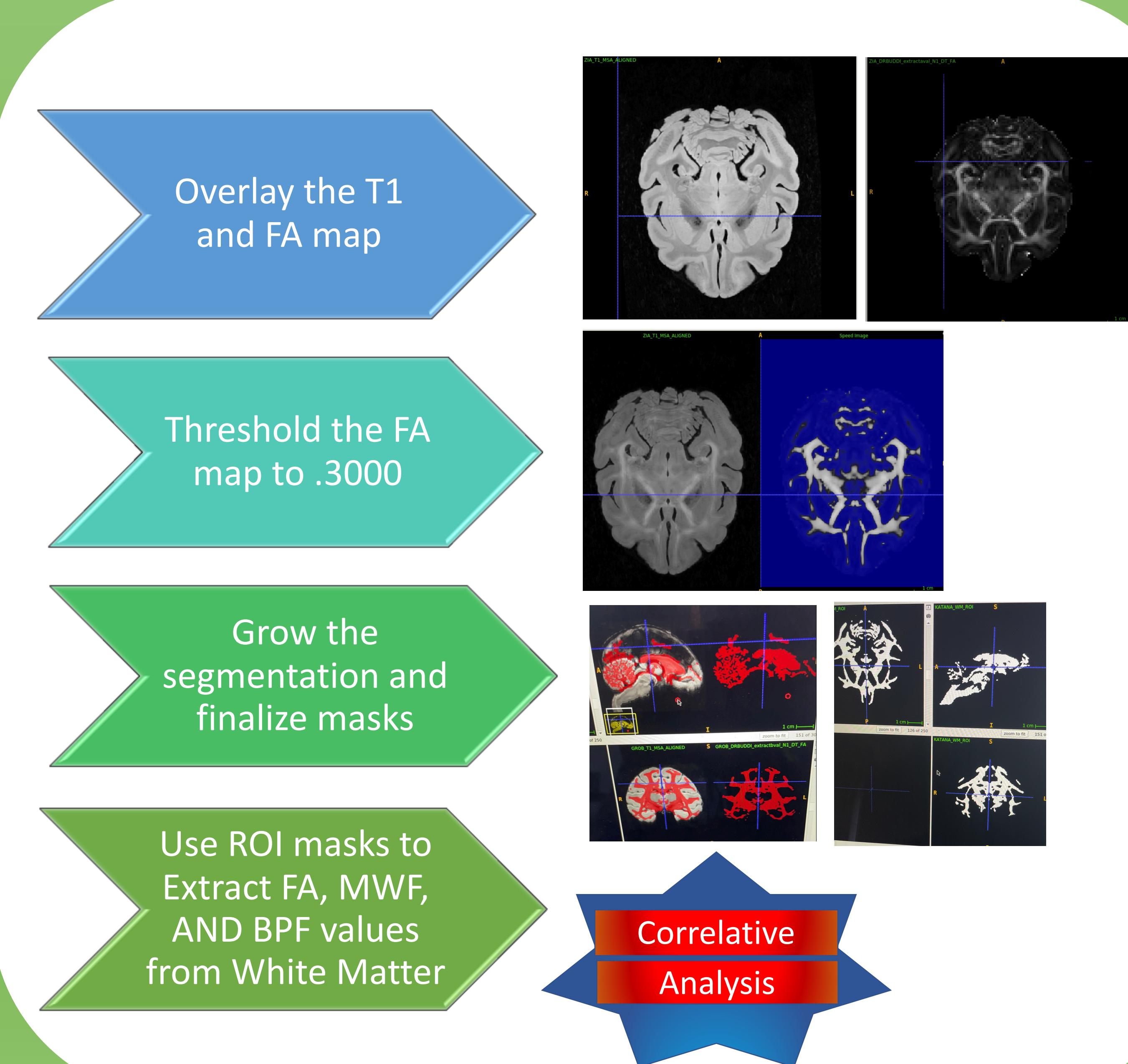


Figure 1: Myelinated Axon

Materials and Methods



Introduction

- The best way to understand a neurological disease is by looking at normal neurological functions. Normal aging tells us about normal changes that the brain undergoes.
- Objective:** evaluate regions of interest in the brain to determine whether the brain's structure and function are affected by normal aging
- Goal evaluate how normal aging impacts white matter in the brain of Bonnet Macaques
- Previous research:** Provided the rationale for looking at normal aging in humans. Since primates don't sporadically develop dementia with respect to normal aging

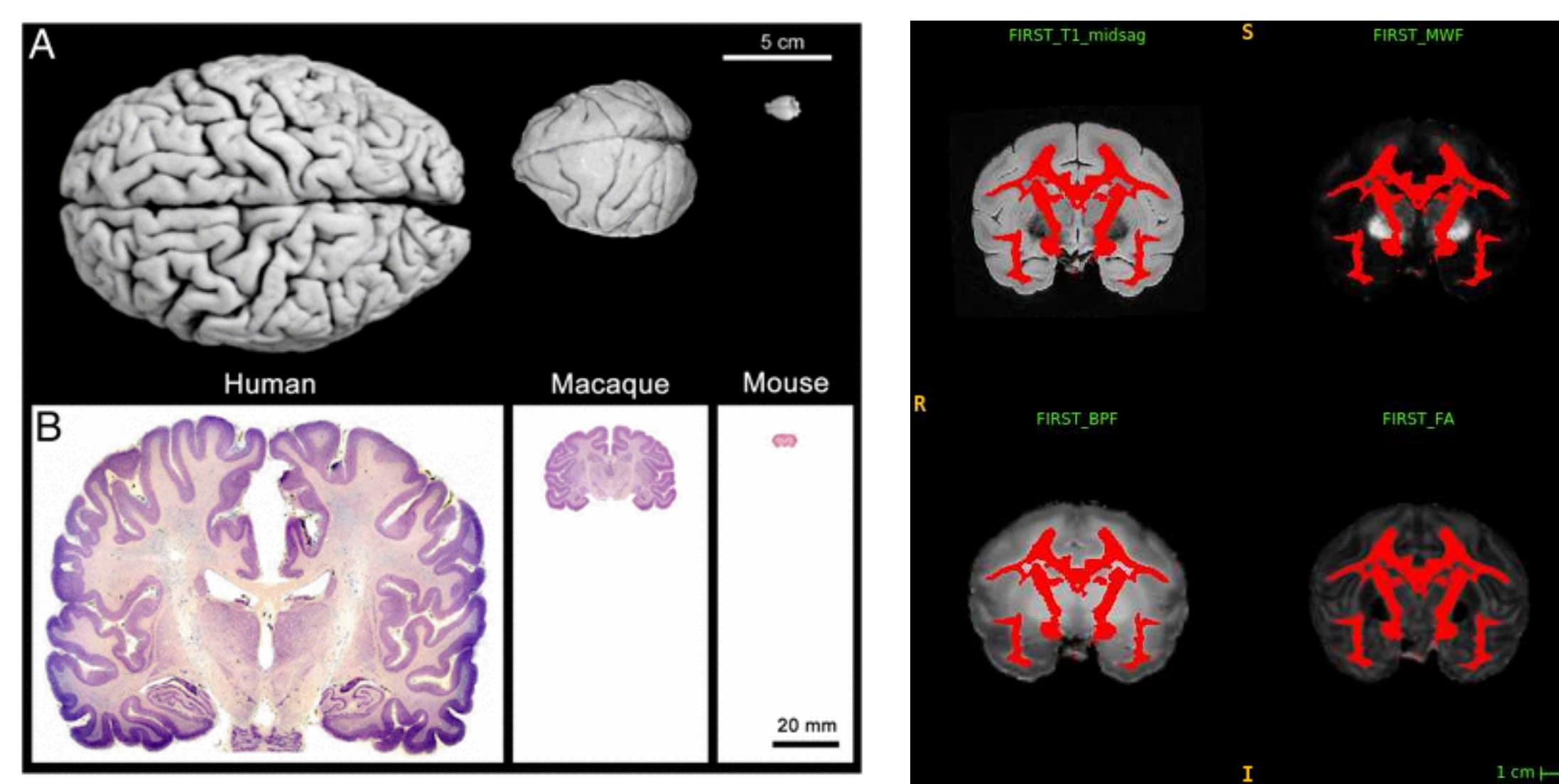


Figure 2: Human, Macaque, and Mouse brain scale

Figure 3: Different types of MRI markers

Results

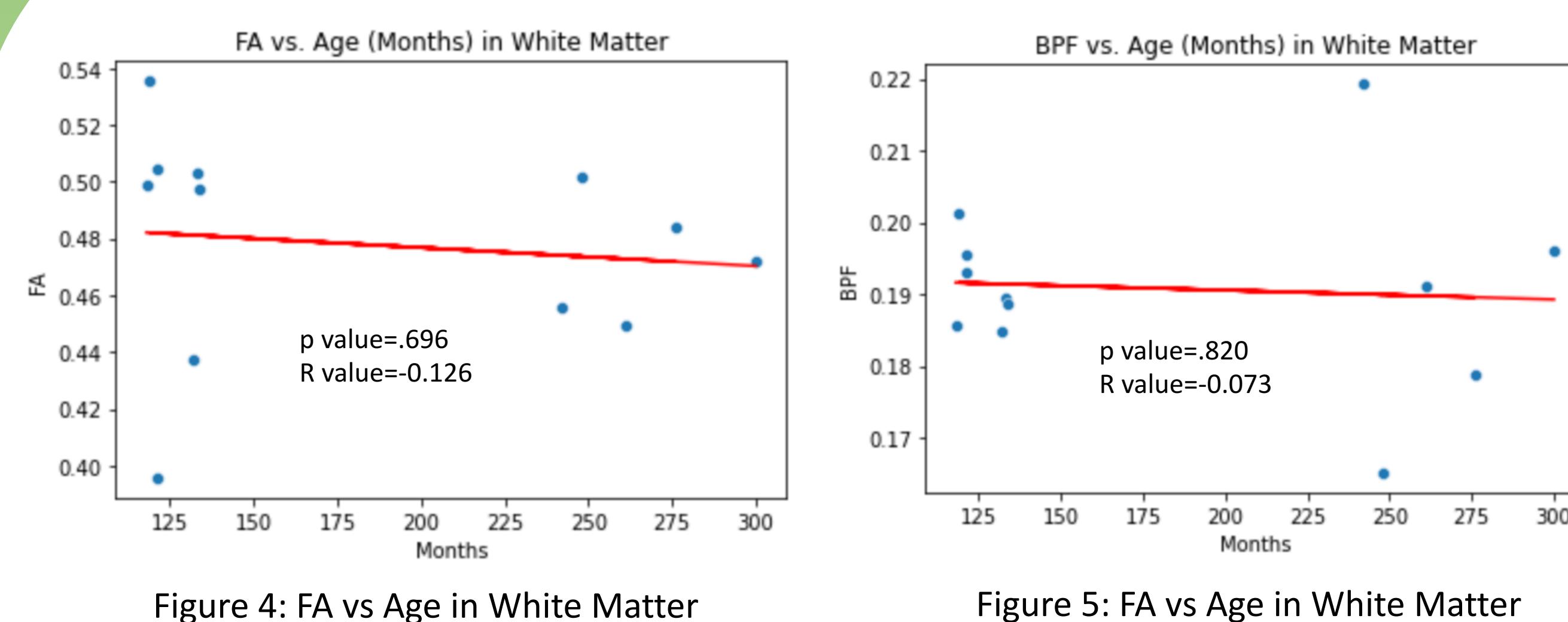
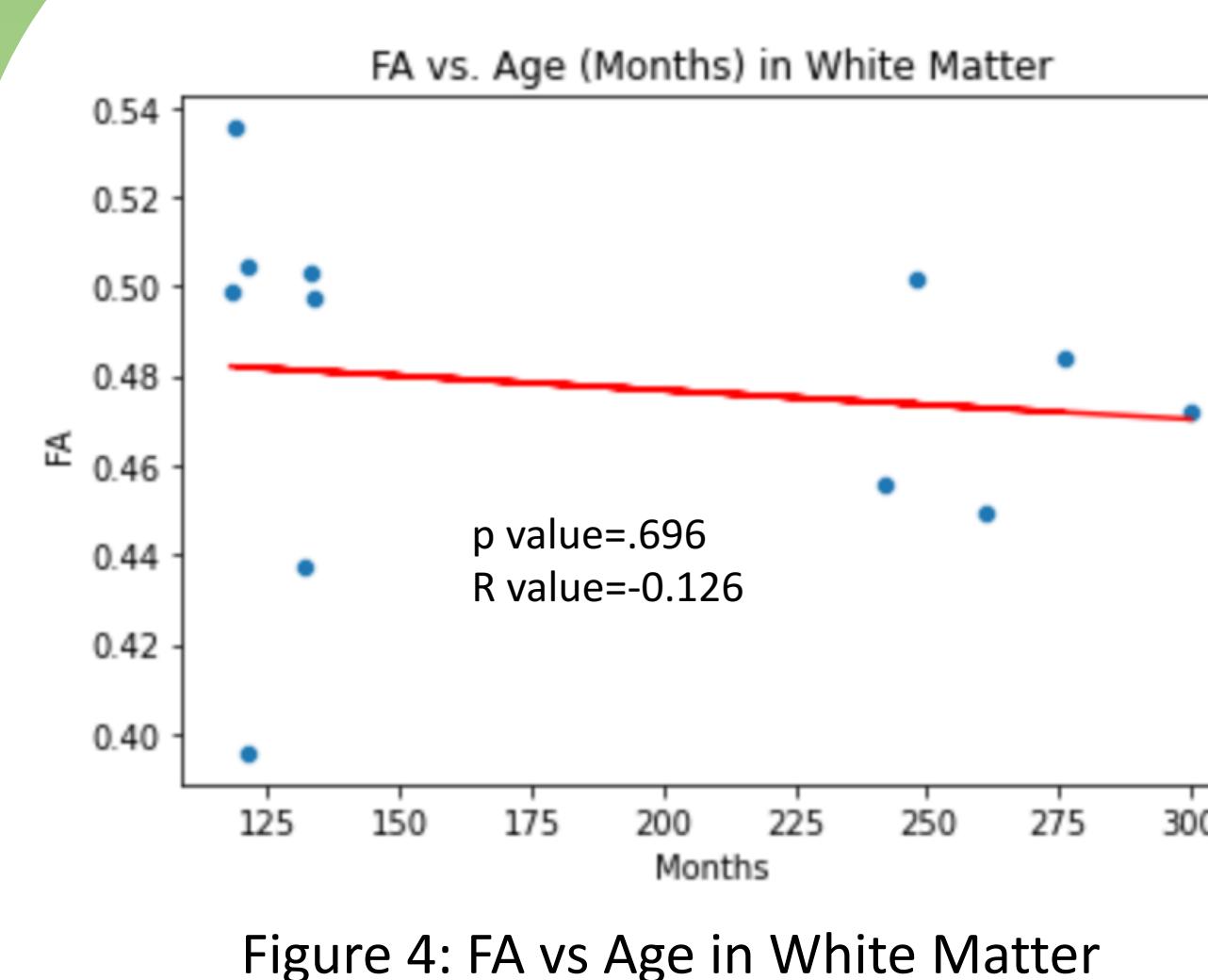


Figure 4: FA vs Age in White Matter

Figure 5: FA vs Age in White Matter

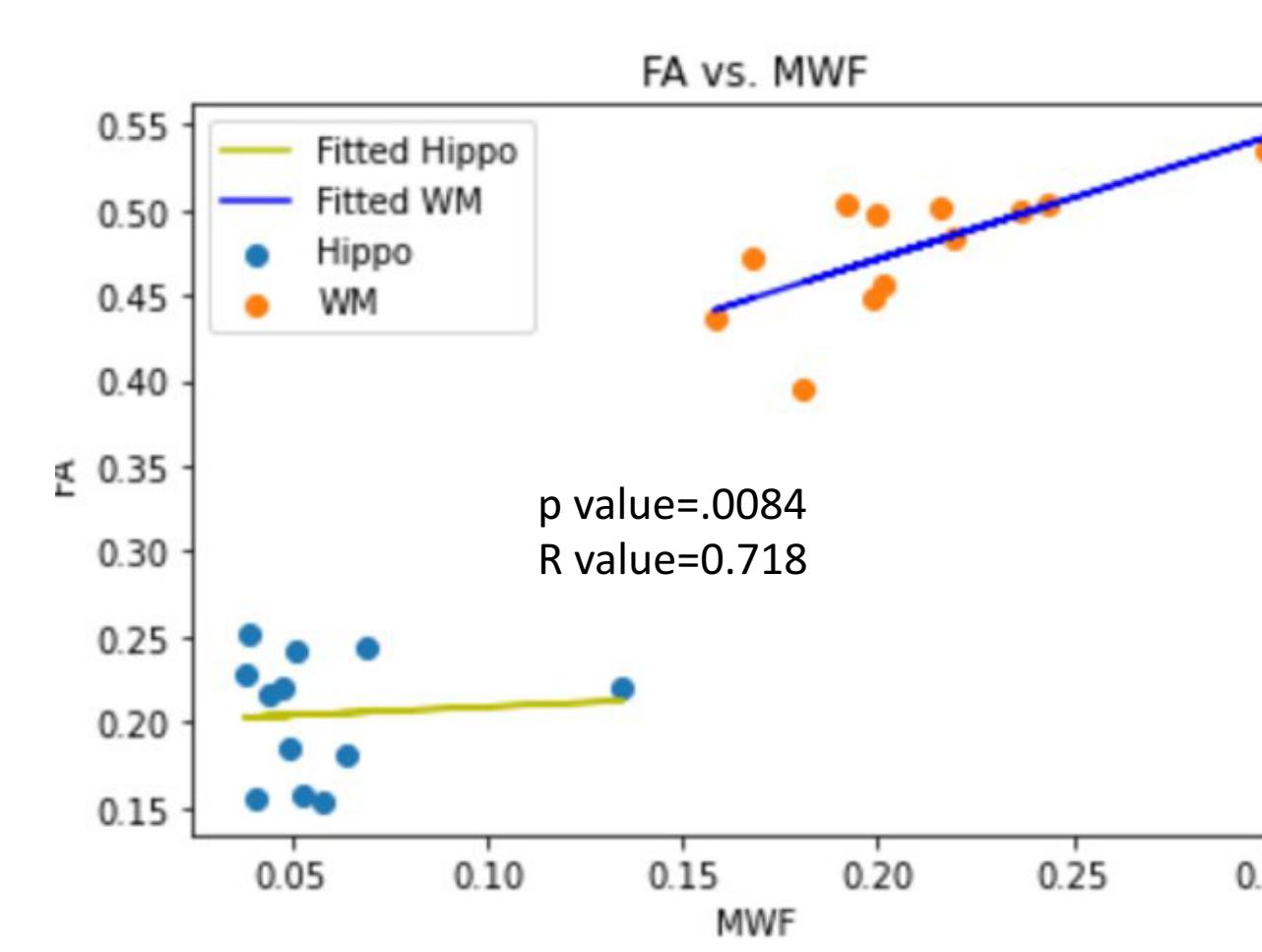


Figure 4: FA vs MWF

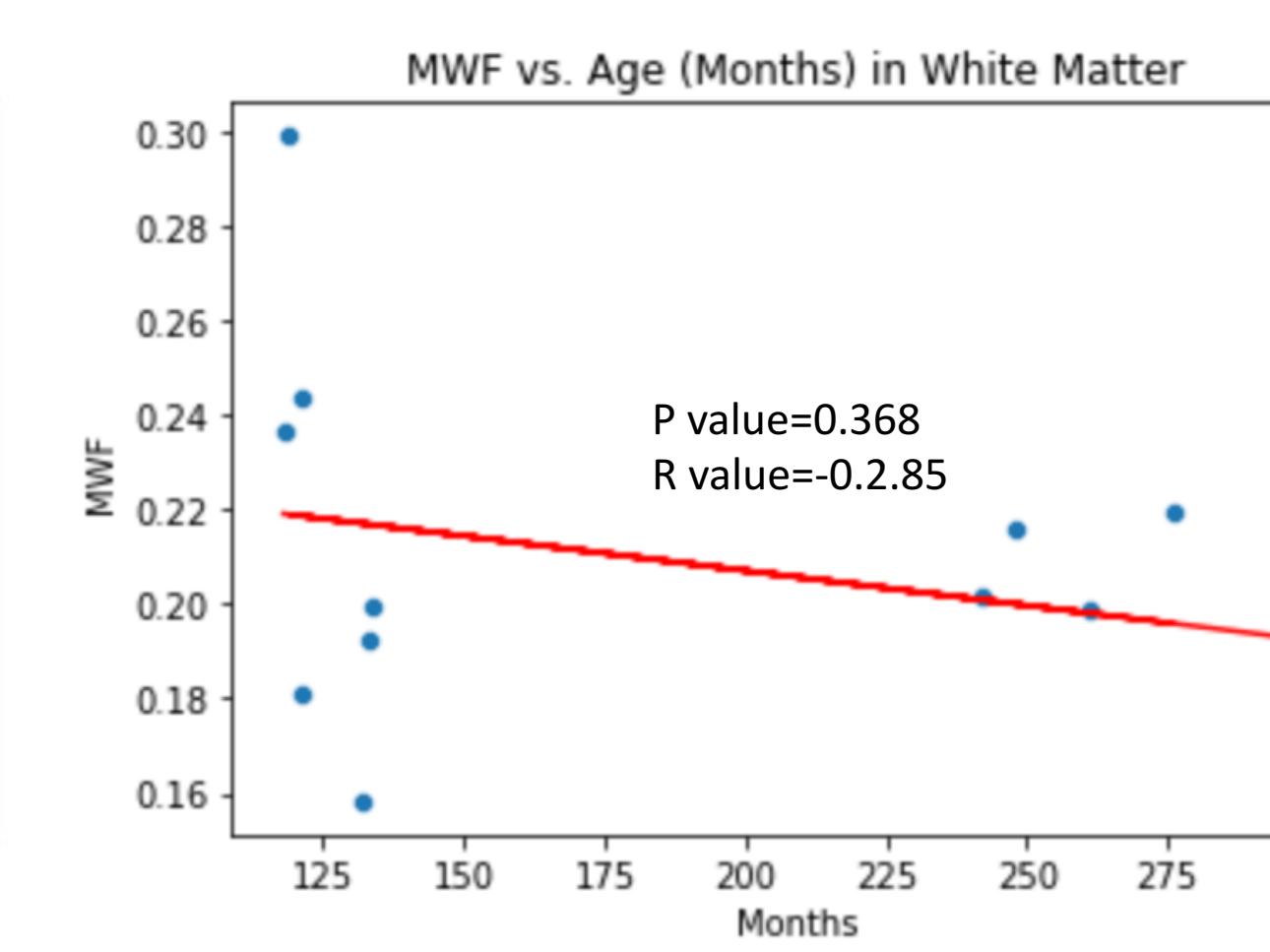


Figure 4: MWF vs Age in White Matter

Discussions/Conclusion

- The research aimed to scrutinize the impact of normal aging on post-mortem Bonnet Macaques white matter
- Initially, we hypothesized that the MRI markers, Fractional Anisotropy (FA), Bound Pool Fraction (BPF), and Myelin Water Fraction (MWF) would decrease as a result of aging.
- We found no statistical significance between age and the MRI markers of the white matter that was evaluated.
- Possible explanation: evaluated the entire white matter region rather than a single tract.
- Our results confirm the result of the previous researchers that evaluated white matter volume throughout normal aging.

Future Directions

- The same MRI markers could be used to evaluate the anterior Commissure, a white matter tract that connects the temporal lobes and plays a role in processing speech, hearing, and memory.
- Future evaluations of different regions of interest would improve our understanding of the brain's structure and function across a lifespan, which would aid us in recognizing dementia or other neurodegenerative diseases precisely

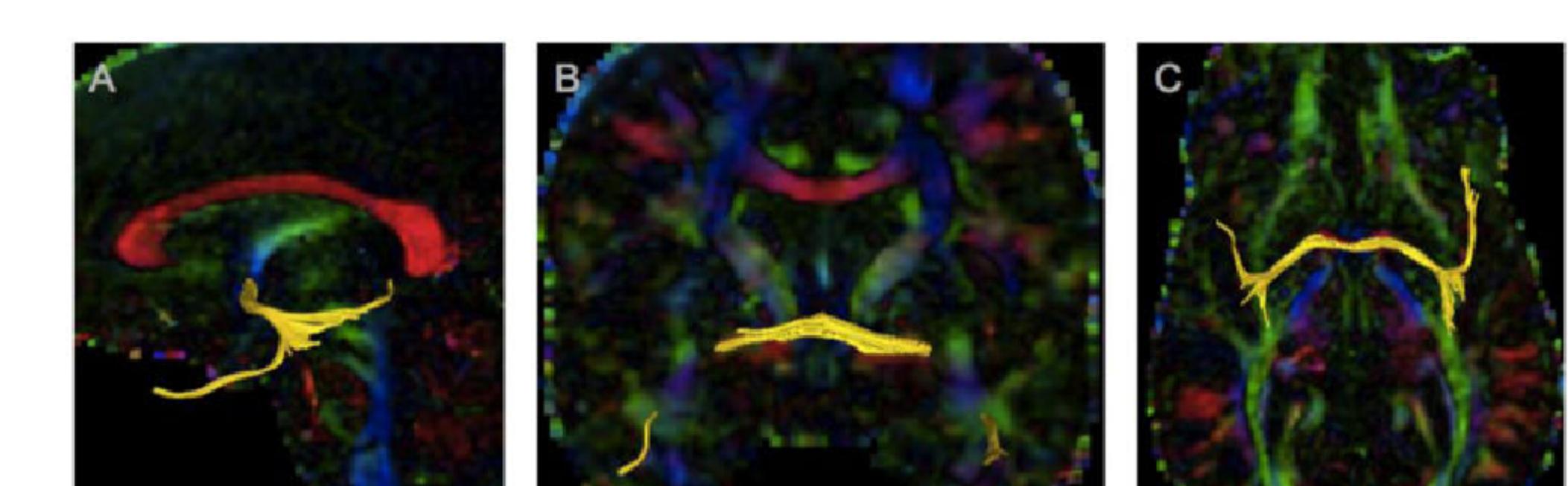


Fig.6 Anterior Commissure White Matter tract

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References

