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(U*) Axon Diameter Inferences in Substructures of the Mouse Corpus Callosum

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Approximately 1 in 6 people globally are affected by a Neurological disorder. Previous research has linked numerous Neurological disorders post-mortem to abnormalities in axon distribution and integrity within neural white matter tracts. Therefore, it is of high interest to investigate methods that will eventually be able to measure axon diameters in white matters tracts in live brains. This would allow for the development of new clinical applications such as earlier diagnosis and allow for the development of new treatments. Diffusion MRI is a method with the potential to infer microstructure in live brains using temporal diffusion spectroscopy (TDS). TDS, when used with certain pulse sequences, such as Oscillating Gradient Spin Echo (OGSE), can be used to infer micron-scale axon diameters. To calibrate TDS with OGSE, an ex vivo mouse brain was imaged and analyzed in this project and many substructures were studied to assess the differences within a mouse. The images were collected using a 7T Bruker AvanceIII NMR system with Paravision 5.0 and were processed and analyzed using MATLAB. The mean diameter inferred of axons in the corpus callosum ranged from $2.6 \pm 3.4 \mu\text{m}$ to $5.6 \pm 1.0 \mu\text{m}$, with an average of $5.3 \pm 0.2 \mu\text{m}$. The next step is to increase the precision of the measurements with the goal of being able to measure axon diameters in in vivo mouse brains.

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Keyword-2

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Keyword-3

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Primary author: CHISHOLM, Madison (Neuroscience, The University of Winnipeg)

Co-authors: CUI, Jiaqi (School of Computer Science, Sichuan University); FRIESEN, Emma (Biochemistry, The University of Winnipeg); Dr MARTIN, Melanie (Physics, The University of Winnipeg)

Presenter: CHISHOLM, Madison (Neuroscience, The University of Winnipeg)

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