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(U*) (POS-45) Measuring Axon Diameters in Mice Using Oscillating Gradient Spin Echo MRI Sequences

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Schizophrenia is a neurological disease that affects 20 million people world-wide. Previous research has linked Schizophrenia post-mortem to abnormalities in axon distribution and integrity within the corpus callosum. Therefore, it is of high interest to investigate methods that will eventually be able to measure axon diameters in areas such as the corpus callosum in live brains. This would create new clinical applications such as earlier diagnosis, and allow for the development of new treatments. Diffusion MRI is a method with 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, ex vivo mouse brains were imaged and analyzed in this project. The images were collected using a 7T Bruker AvanceIII NMR system with Paravision 5.0 and were processed and analyzed using MATLAB. The method was able to infer axon diameters on the order of a few microns in size from some of the image sets. Electron microscopy measurements to confirm the MRI findings are planned. Further work is being done to improve image quality and optimize MRI parameters for more precise measurements.
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Authors: CHISHOLM, Madison (Neuroscience, The University of Winnipeg); KING, Ashely (Neuroscience, The University of Winnipeg); ANDERSON, Melissa (Biomedical Engineering, University of Manitoba); DEL BIGIO, Marc (Pathology, University of Manitoba); HERRERA, Sheryl (Cubresa, Inc.); MARTIN, Melanie (Physics, The University of Winnipeg); ZHANG, Gong (Physics, The University of Winnipeg)

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

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