

## **William D. Rooney, PhD**

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Dr. Rooney is a physical chemist and his research focus is on the development of non-invasive MRI/MRS biomarkers of normal physiology and pathophysiology with a strong emphasis on vascular and metabolic phenotyping. A major thrust of his group's work aims to characterize brain blood vessels using dynamic MRI acquisitions combined with pharmacokinetic modeling. These techniques are applied to better understand how brain blood vessels change in disease processes such as multiple sclerosis, Alzheimer's disease, and brain tumors. Another area of interest is the investigation of cellular metabolism and its relationship to tissue degeneration. Rooney and colleagues use  $^{31}\text{P}$  and  $^1\text{H}$  MRS techniques to investigate the relationship between deficits in energy metabolism and tissue loss and demonstrate more substantive changes in MS gray matter than white matter. The group has developed novel techniques to map tissue metabolic activity at high spatial resolution and is using these methods to better understand neurodegeneration. Another research focus of Rooney's group is to understand the fundamental physiology of the glymphatic system in the human brain and generate maps of its function. The overall goals of these research themes are to expand fundamental understanding of disease pathophysiology and to improve our ability to diagnose disease and assess therapy. Other research interests include novel pulse sequence design, and the design and construction of scientific instruments.