

Sagar Buch, Ph.D.

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Dr. Buch has more than 10 years of experience in the field of neuroimaging and implementing advanced magnetic resonance imaging (MRI) quantitative techniques. Dr. Buch's background and expertise has been in MRI physics, development and optimization of MR-based protocols for quantitative imaging such as quantitative susceptibility mapping (QSM) along with MR angiography/venography, susceptibility weighted imaging (SWI) and signal processing for studying the cerebral microvasculature with an eye toward their effects in normal aging, as well as in neurodegenerative and neurovascular diseases. QSM utilizes the field perturbations and computes the underlying spatial distribution of susceptibility by solving the inverse problem, a process to which he has made several contributions including the development of a 3D numerical model of the whole brain that has been used to analyze the effects each individual step involved in the QSM process and in developing a technique to map structures that exhibit no discernable MRI signal such as the sinuses and teeth. Lately, his focus is on using an optimized high-resolution protocol for ultrasmall superparamagnetic iron oxides (USPIO)-based imaging. This study involves studying the vascular pathophysiology, implementing image processing and reconstruction to plan the next generation of microvascular imaging, which is referred to as MICRO or, Microvascular In-vivo Contrast Revealed Origins to study microvascular details in animals and in humans. This in vivo protocol allows us to reveal the underlying vascular details in healthy subjects to study the effects of normal aging on the vasculature; and vascular abnormalities such as submillimeter-sized lesion-centric developmental venous anomalies (DVA) that was only thought to be possible on the cadaver brain data. This project has sparked new-found interest in the field of neurovascular imaging. Dr. Buch was awarded the Potchen–Passariello Award from the Society for Magnetic Resonance Angiography (SMRA) in 2021, and a Summa Cum Laude Award, from the International Society for Magnetic Resonance in Medicine (ISMRM) in 2020.

Speech Title: In vivo Vascular Mapping of the Human Hippocampus Using MICRO Imaging