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4D FLOW MRI: ASSESSMENT OF HEMODYNAMICS USING MAGNETIC RESONANCE IMAGING



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Abstract: MRI techniques provide a non-invasive method for the highly accurate anatomic depiction of the heart and vessels. In addition, the intrinsic sensitivity of MRI to flow, motion and diffusion offers the possibility to acquire spatially registered functional information simultaneously with the morphological data within a single experiment. Characterizations of the dynamic components of blood flow provide insight into normal and pathological physiology. The study of hemodynamic alterations in patients with cerebrovascular disease is integral to understanding a component of the pathology, potentially improving diagnostic capabilities and therapeutic planning. Abnormal blood flow patterns, such as turbulent blood flow, may contribute to disease progression. Such flow disturbances can induce shear force alterations, endothelial dysfunction, and thus promote disease via vascular remodeling. 4D flow MRI combines ECG-synchronized 3D phase-contrast MRI with advanced post-processing strategies and has been successfully applied to quantitatively evaluate *in vivo* 3D blood flow with full volumetric coverage of the vessels of interest. In this lecture I will explain how blood flow can be measured with MRI and how it is used for research and clinically.

Bio: Dr. Susanne Schnell holds a PhD degree in Computer Science from University of Freiburg, Germany. After finishing her Electrical Engineering degree in Hamburg, Germany and her Master of Science in Biomedical Engineering she worked in Research and Development in industry for 2 years. She then changed back to academia and went to work on her PhD in Freiburg, Germany finishing her PhD in 2010. During her PhD as well as post-doc and Assistant Professor, Dr. Schnell worked in the field of MRI including image processing as well as MRI sequence design. Since 2011, Dr. Schnell has been at Northwestern University where she currently is Assistant Professor in the Radiology Department of Feinberg Medical School and oversees the 4D Lab, a quantitative image analysis lab for time-resolved MRI data. Dr. Schnell has authored or co-authored over 45 peer-reviewed papers on various topics in MR.