# Editorial

# Physiological MRI

Timothy Q. Duong*

*SI Glickman MD Endowed Chair, Professor, MRI Division Chief and Assistant, Assitant Director, Research Imaging Institute, UT Health Science Center San Antonio, USA*

Welcome to this special issue of the **Open Neuroimaging Journal** which focuses on physiological MRI as reviewed by a panel of leaders in the field. The use of MRI to investigate brain physiology has grown at a very rapid pace. The spatial resolution and spatial specificity of neuronal activiation as detected by fMRI have markedly improved over the past decade. The fMRI signal sources and the hemodynamic response functions are considerably better understood. Multimodal MRI techniques that include quantitative BOLD, blood flow, blood volume, and oxygen extraction fraction measurements are becoming routine. These techniques have been applied to study cerebral physiology and neuroenergetics under various experimental conditions in normal brains as well as diseased states such as stroke. Spontaneous low-frequency fluctuations of the BOLD fMRI signals also reveal the very dynamic brain at rest. The physiological data from multimodal MRI measurements are very rich in content and much work remains in order to completely decipher the information in these data.

*Address correspondence to this author at the SI Glickman MD Endowed Chair, Professor, MRI Division Chief and Assistant, Assitant Director, Research Imaging Institute, UT Health Science Center San Antonio, Usa; E-mail: duongt@uthscsa.edu; http://ric.uthscsa.edu/duong/index.htm

This special issue describes a wide range of exciting MRI developments and applications to study neurophysiology. Yacoub and Olman review the improved spatial resolution and signal specificity of fMRI signals at high magnetic fields. Lu and colleagues investigate the relationship between "M" in calibrated fMRI and other physiologic modulators of the fMRI signals. Lin *et al.* describe the stimulus rate-dependent cerebral blood flow-volume coupling in activated human visual cortex using fMRI. Kim and Kim describe the novel MRI measurements of compartment-specific arterial blood volume and its application to fMRI studies. An *et al.* describe the use of novel MRI to image oxygen extraction fraction. Khan and colleagues model the hemodynamic response function in rat using high spatiotemporal speckle imaging data and explore its implications in fMRI signals. Yan and colleagues report the spontaneous low frequency fluctuations of BOLD fMRI in young and aged subjects. And last but not least, Sun *et al*. review the use of multimodal MRI to characterize cerebral ischemia.

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