

# **MRI Biomarkers for Renal Function and Disease**

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Diseases of the kidney represent a growing economic and public health crisis, and there is a need to develop improved prognostic and diagnostic methods to address this concern. Magnetic resonance imaging has the capability to produce high-resolution anatomic images as well as images of physiological function. This work presents a number of studies investigating the use of functional MRI methods in the context of renal function and renal disease. In particular, I used arterial spin-labeling (ASL) and blood oxygen level-dependent (BOLD) MRI to identify longitudinal changes of perfusion and oxygenation in renal transplant donors and recipients. I also designed and implemented spiral-readout MRI approaches for fast, efficient scanning of small animals, and I utilized these methods together with hyperpolarized [1-<sup>13</sup>C]pyruvate to investigate the metabolic response to unilateral ureteral obstruction in a preclinical mouse model. Finally, I characterized the confounding effects of anesthesia on BOLD MRI measurements in small animals. Together, the results of these studies may lead to improvement of several aspects of functional renal imaging, and contribute to efforts to characterize markers of renal disease using MRI.