Molecular Imaging *via* ^{19}F MRI

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Among preclinical molecular imaging approaches, fluorine (^{19}F) MRI has recently attracted great interest from the biomedical research community due to the special properties of fluorinated materials and the ^{19}F nucleus. Fluorine is the most sensitive nucleus for MRI besides hydrogen, but is present in the body only in insignificant amounts, allowing background-free detection of fluorinated substances as 'hotspots' by combined ^{1}H/^{19}F MRI and making fluorine-containing molecules ideal tracers for a wide range of MRI applications. In addition, there exists a well-characterized class of compounds – perfluorocarbons – that have very high fluorine content and are both biochemically and physiologically inert. Creative molecular design also allows the MR properties (especially chemical shift and relaxation times) of these compounds to be made 'responsive' to changing environmental conditions (such as pH, PO_2, enzyme activations, etc.) and thus used for their readout. The talk will focus on recent advances in ^{19}F MRI with special emphasis on cardiovascular diesease models and will span a very interdisciplinary field – from chemistry to synthesize specific probes to biomedical applications as well as physics for optimizing data acquisition and processing to further increase sensitivity and specificity.