Abstract:

Complementary to MRI, magnetic resonance spectroscopy (MRS) techniques may be utilized to reveal abnormalities before any visible macroscopic changes in anatomy and physiology occur since they provide unique information on the chemical composition of the human tissue. Some chemicals that can be measured non-invasively in the human (1) endogenous neurotransmitters; glutamate and gamma-aminobutyric acid (GABA) (2) sodium and (3) lipids. When applied to in vivo human imaging, MRS can be used to characterize metabolic processes and identify aberrant neurochemical or metabolic relationships related to disorders. Thus, MRS may become even more tightly integrated with molecular parameters. For instance, the subcellular sensitivity of ultra-high-field (7 Tesla) MRS has been demonstrated by discriminating between common cytosolic isocitrate dehydrogenase 1 (IDH1) and rare mitochondrial IDH2 mutations in glioma patients. Thus, this talk aims to give an overview of recent methodological developments, discoveries, and applications of MRS to in vivo human imaging at high and ultra-high-field.