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Quantitative MRI measures in SIV-infected macaque brains

Xiaodong Zhang[1,2] and Chunxia Li[1]
[1]Yerkes Imaging Center, Yerkes National Primate Research Center, Emory University, USA
[2]Division of Neuropharmacology and Neurologic Diseases, Yerkes National Primate Research Center, Emory University, USA

Multiple MRI modalities including Diffusion Tensor Imaging (DTI), perfusion MRI, *in vivo* MR Spectroscopy (MRS), volumetric MRI, contrast-enhanced MRI, and functional MRI have demonstrated abnormalities of the structural and functional integrity as well as neurochemical alterations of the HIV-infected central nervous system (CNS). MRI has been proposed as a robust imaging approach for the characterization of the stage of progression in HIV infection. However, the interpretation of the MRI findings of HIV patients is complicated by the fact that these clinical studies cannot readily be controlled. Simian immunodeficiency virus (SIV) infected macaques exhibit neuropathological symptoms similar to those of HIV patients, and are an important model for studying the course of CNS infection, cognitive impairment, and neuropathology of HIV disease as well as treatment efficacy. MRI of non-human primates (NHPs) is of limited benefit on most clinical scanners operating at or below 1.5 Tesla because this low field strength does not produce high-quality images of the relatively small NHP brain. Contemporary high field MRI (3T or more) for clinical use provides impressive sensitivity for magnetic resonance signal detection and is now accessible in many imaging centers and hospitals, facilitating the use of various MRI techniques in NHP studies. In this article, several high field MRI techniques and applications in macaque models of neuroAIDS are reviewed and the relation between quantitative MRI measures and blood T-cell alterations is discussed.

xzhang8@emory.edu