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Evaluation of neuronal and axonal damage after traumatic brain injury using quantitative magnetic resonance imaging techniques

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Traumatic brain injury (TBI) is a major cause of disability and death, mainly in young adults. TBI is classically a model of a monophasic neuronal lesion, in which brain tissue damage, including neuronal and glial cells injury, results from transfer of kinetic energy to the brain. Neuronal and axonal damage may result from a direct lesion at the moment of impact. It is logical to believe that neuronal injury is limited to the acute and subacute phases after the traumatic event, followed by a short time of subsequent retrograde and anterograde (or wallerian) axonal degeneration. Once this process ends, stabilization of the neuronal injury would be expected. However, experimental studies have shown that delayed cerebral changes occur after TBI, particularly demonstrated by progression of cerebral atrophy, proposing a delayed progressive neuronal loss. Delayed neuronal loss after TBI is similar to other neurodegenerative processes. Studies have shown that TBI victims may have persistent deficits in attention, memory and some executive functions, even in mild trauma. Recently, Magnetic Resonance (MR) imaging has been described as a promising noninvasive technique to evaluate axonal and neuronal injury secondary to TBI, by using special sequences with quantitative analysis, such as volumetric measurement, relaxometry, proton MR spectroscopy (1H-MR spectroscopy), magnetization transfer, diffusion-weighted and diffusion tensor imaging (DWI and DTI).

Biography

Dr. Mamere is a Radiologist specialized in Diagnostic Neuroradiology, with 12 years of experience in magnetic resonance imaging. Master Scientific Degree in 2005 at University of Sao Paulo. He is regularly enrolled in the PhD course at University of Sao Paulo, to be finished in June 2012. Chairman of the Department of Radiology and Diagnostic Imaging at Barretos Cancer Hospital from 2008 to 2010. He performs research in Neuroradiology using advanced quantitative MR imaging techniques, mainly in patients with brain tumors.

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