

Tracking of Stem Cells with Magnetic Resonance Imaging

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Abstract

Recently various cell therapies have improved outcome of many diseases. A critical component of cell therapies is the ability to track the cells after transplantation. Monitoring a cell's survival, migration, differentiation, and integration within host tissue is crucial for assessing the safety and efficacy of cellular treatments. In this talk magnetic resonance imaging (MRI) based tracking of stem cells is presented, where cells labeled with superparamagnetic iron oxide (SPIO) nanoparticles can be tracked in a chicken embryo model up to 10 days post transplantation. Nevertheless, SPIO nanoparticles as a T_2^* contrast agent are usually associated with signal loss in MR images, leading to difficulties for cell tracking. To overcome this problem, a new imaging sequence, SWIFT with water and fat suppression, is introduced. Compared with other conventional pulse sequences, such as spin echo and gradient-recalled echo, the SWIFT approach enhances in vivo mapping of SPIO distribution in tissues, and improves detection sensitivity of SPIO nanoparticles.

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