Perfusion and Diffusion Mismatch MR Imaging of the Brain with Radial Acquisition (PENUMBRA)

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Technology description

Short Description
Improved perfusion- and diffusion-weighted MRI exam for clinical uses, including imaging for ischemic stoke.
Abstract
Northwestern researchers have developed a non-invasive, diagnostic imaging exam which simultaneously acquires perfusion- and diffusion-weighted magnetic resonance (MR) images for patients with acute ischemic stroke. This single, quick exam uses a 3D-based MR pulse sequence with radial gradient trajectories that acquires high resolution images for the entire brain. The exam takes less than two minutes.

Application area

Quantification of perfusion and diffusion for clinical imaging, for example:
Ischemic penumbra in acute ischemic stroke
Central nervous system tumors, cerebrovascular occlusive disease and Alzheimer's disease using the Bookend Technique Abdominal imaging in liver and kidney disease
Spinal imaging in multiple sclerosis Lower extremity imaging in peripheral arterial disease

Advantages

Simultaneous acquisition of perfusion- and diffusion-weighted images
Improved spatial resolution Improved coverage, especially of large structures such as the spine
Improved accuracy of time-based metrics, such as time-to-maximum and time-to-peak
Reduction in cortical blooming artifacts that can make determination of cerebral perfusion unreliable
Reduces total acquisition time from 10 or more minutes to less than two minutes
Spatial resolution and slice location are identical between perfusion and diffusion images, which eliminates the need for a specially-trained technician to manually overlay images

Institution

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