Dual Resolution Acquisition of Magnetic Resonance Angiography Data with Vessel Segmentation

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Technology description

Magnetic resonance angiography (MRA) is a type of magnetic resonance imaging (MRI) that generates images of blood flow through vessels. Its many medical applications include the diagnosis of artery and veins abnormalities, such as aneurysms in the brain.

To enhance MRA’ s diagnostic capability, a contrast agent can be injected prior to the MRA scan; however, image data must be acquired at the moment the contrast agent is flowing through the vessels of interest. Thus, images must be taken very rapidly, severely limiting their resolution and quality.

UW–Madison researchers previously invented a vessel segmentation technique to improve the resolution and quality of contrast-enhanced MRA (CE-MRA) images. It entails capturing a series of low-resolution images when the contrast agent first flows through arteries and veins, and then using this information to pinpoint, or segment, the locations of arteries and veins in a high-resolution image acquired over a longer time period. UW–Madison researchers have developed an improved vessel segmentation technique that involves two-dimensional correlation analysis, resulting in an MRA image of even higher spatial resolution and signal-to-noise ratio.

Application area

MR imaging of human vasculature

Advantages

Unlike X-ray imaging methods—the current gold standard for studying human vasculature—this invention does not use an invasive catheter to inject the contrast agent
Will not subject the patient to potentially harmful ionizing radiation
Projected to provide the same detail as an X-ray angiogram
CE-MRA technique with immense clinical utility
Provides a high resolution, high signal-to-noise ratio image of the human vasculature
Can be used with a number of different pulse sequences

Preferably uses a 3-D gradient recalled echo pulse sequence

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