

A new MRI technique for measuring flow territories and perfusion territories: continuous artery-selective spin labeling (CASSL)

General information

In many clinical situations, the ability to image flow territories or perfusion territories of individual arteries may be of great value. Diagnosis and therapy monitoring of cerebrovascular disease, e. g. in embolic stroke, may benefit as well as applications in cardiac imaging, such as coronary angiography or myocardial perfusion imaging.

State of the art

There are only a very few methods known that can image the flow territories or perfusion territories of individual arteries. All of them use MRI in combination with arterial spin labeling (ASL), applying a magnetic label to the inflowing blood. They suffer from signal-to-noise difficulties and/or a limited ability to account for different geometrical situations.

The invention

Continuous artery-selective spin labeling (CASSL) is a new MRI method capable of applying an arterial spin label to any blood vessel. In contrast to other arterial spin labeling methods, where all of the blood in a certain volume or all of the blood flowing through a certain labeling plane is labeled, in CASSL a localized labeling of individual arteries is achieved so that the flow territories or perfusion territories of these arteries can be imaged.

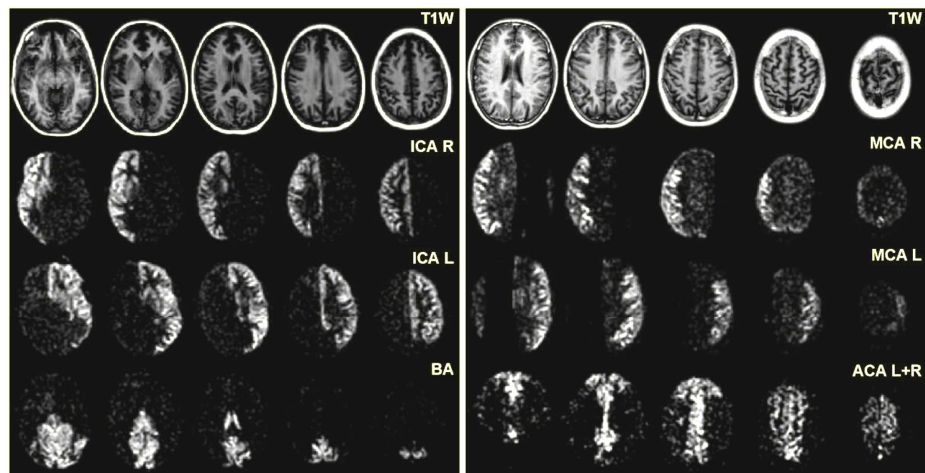


Fig. 1: Continuous artery-selective spin labeling (CASSL) is a new method for a selective arterial spin labeling. It is based upon continuous ASL and modulates the position of the labeling plane to target individual arteries in a very flexible way. The images were acquired on a 1.5 T Intera system and show two volunteers' perfusion territories of the extracranial arteries (ICA = internal carotid artery, BA = basilar artery) and - for the first time ever - of the cerebral arteries distal to the Circle of Willis (MCA = middle cerebral artery, ACA = anterior cerebral arteries).

Courtesy of Richard Werner et al. Section of Neuroradiology, Christian-Albrechts-Universität zu Kiel, Germany and David G. Norris, FC Donders Centre for Cognitive Neuroimaging, Nijmegen, Netherlands

Images as presented at the Philips booth during both the ISMRM annual meeting 2005 and the RSNA 2005.

The method is based on the entirely new idea to vary the labeling plane during the labeling process. Applications include a visualization of cerebral perfusion territories, cerebral flow territories, and potentially of flow territories and/or perfusion territories in any other organ including the heart. Proven results with excellent image quality have been obtained with regard to cerebral perfusion territory imaging (Fig. 1). For the first time ever, it was possible to image the perfusion territories of the cerebral arteries distal to the Circle of Willis.

Market potential

Because of the immediate impact on the diagnosis of embolic stroke, where a visualization of the individual perfusion territories can determine the origin of an embolus, there is a strong current interest in the method in many neuroradiological departments. In our opinion, the demand in these departments is strong enough that it may well influence the decision for a certain manufacturer when a new MR system is to be chosen. In the long term, however, there may also be further promising applications stimulating demand from other clinical departments as well.

Utilisation concept

Licencing of this invention is sought to a company that will bring to market the CASSL technique described. If desired PVA SH GmbH will further assist utilization through arranging contact with the inventor and the research institutes engaged in the development of the technique as further evaluation of the method is in progress (DFG-funded research project at the University Hospital of Schleswig-Holstein to start in March 2006)

Contact

PVA SH GmbH

Dr. Alexandra Baumgartner
Wissenschaftszentrum
Fraunhoferstr. 13
D-24118 Kiel

Tel. (0431) 800 99 37
FAX (0431) 800 99 33
E-Mail baumgartner@pva-sh.de

Publications

Richard Werner, David G. Norris, Karsten Alfke, H. Maximilian Mehdorn, Olav Jansen: **Continuous artery-selective spin labeling (CASSL)**. Magnetic Resonance in Medicine – Volume 53, Issue 5, May 2005, 1006-1012