Low speed flow mapping with MRI Aladdin spinal magnetically labeling

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Speaker: Pavel Rudych is an engineer and project manager at Novosibirsk State University and the International Tomography Centre of Novosibirsk. Pavel received his M.S. in Physics from Novosibirsk State University, Russia, in 2005 and his second B.S. in Clinical Psychology in 2021. His research interests are in functional MRI and coregistered EEG experiments, experiment stimulus gamification and environmental transparency based on web, EEG/MRI data aggregation and automated processing, machine learning analysis. Pavel is the author of more than 30 peer-reviewed publications.

Abstract: MRI imaging with spinal labeling are widely used in brain perfusion. The idea is in label the thin slice of liquid and check it's distribution after some time. The water molecules are magnetically labeled (tagged) by using a radiofrequency pulse that saturates water protons and enhance its visibility in magnetic resonance imaging. Subtraction between labeled image and the control non labeled image with the static tissue signals eliminate the non labeled static signals. The resulting image is proportionate to the liquid flow. Arterial spinal labeling (ASL) widely used for high speed blood flow registration und uses single water labeling in neck artierias and not suitable for low speed lymphatic flows. For such a flows it's used the inter-slice liquid perfusion MRI called alternate ascending/descending directional navigation (ALADDIN). In ALADDIN protocol not the whole brain, but the single layer is measured and the measured layer is parallel to the labeling layer and shifted in flow direction. To cover all the brain, the multiple labeling and registrations are required. Our enhancement of ALLADIN protocol and its applications I will describe in details.

Keywords: MRI, flow mapping, ALADDIN, lymphatics