

Monitoring And Predicting Amyloid Therapy Response Using Arterial Spin Labelling Perfusion MRI

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Cerebral blood flow metrics measured by arterial spin labelling MRI correlate strongly with cognitive outcomes in patients un dergoing anti-amyloid therapy, even at early treatment stages. It is a promising tool for precision medicine in treatment response monito ring.

Introduction	Methods	Results	Conclusions	
Treatment guidelines for amyloid therapies mandate MRI scans to monitor for amyloid-related imaging abnormalities (ARIA) at regular intervals. However, no such mandate exists for monitoring treatment response. Arterial spin labelling (ASL), a non-contrast MRI technique that measures cerebral perfusion, can be readily included in existing ARIA monitoring sessions with little change to workflows. This abstract builds on prior work to demonstrate the suitability of ASL to track and predict cognitive change during amyloid therapy.	T1-weighted structural and PCASL images were analysed from 16 patients (9F, aged 71.7±7.2 years, 13 on lecanemab, 3 on donanemab) undergoing amyloid therapy at Weill Cornell Medicine, NY, USA. The images were acquired at baseline and during ARIA monitoring sessions on GE 3T scanners. T1w images were segmented using Freesurfer v8 into the DKT atlas, while ASL data was processed using the QASL pipeline (Quantified Imaging, UK) to quantify cerebral blood flow (CBF), which was transformed into normative z-Scores using a proprietary	model trained on CN subjects from ADNI3. Cognition was assessed using MoCA or MMSE (10 MoCA, 6 MMSE) before and during treatment, with MMSE scores converted into MoCA scores using a published method. Pearson’s correlation was calculated between the change in cognition and mean cortical z-CBF change, calculated from i) between baseline and the MRI session closest to the cognitive test, and ii) between baseline and the MRI session after two months from treatment initiation.	Change in mean cortical z-CBF between baseline and the closest scan correlated significantly with change in cognition (all subjects r=0.71, p=0.0022 ; subjects with MoCA: r=0.81, r=0.0042; subjects with MMSE: r=0.95, p=0.0033). Change in mean cortical z-CBF between baseline and the two-month scan also correlated well with the final cognition change (all subjects r=0.72, p=0.0015 ; subjects with MoCA: r=0.83, p=0.0033; subjects with MMSE: r=0.93, p=0.0063).	CBF measured with ASL MRI was found to correlate strongly with cognitive outcomes on amyloid therapy, and to predict outcomes after two months of treatment. Therefore, ASL is a potential tool for precision medicine in treatment response monitoring. CONTACT Prof. Michael Chappell michael.chappell@quantified-imaging.com  