PLAQUE DETECTION IN THE APPPS1 MOUSE MODEL THROUGH DKI MRI

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\textbf{Introduction and aim:} For testing the potential of diffusion kurtosis imaging (DKI) to detect amyloid in AD, we suggest the use of transgenic APP\textsubscript{(swen)}-PS1\textsubscript{(L166P)} mice at the age of 15m showing effective amyloidosis without the occurrence of neurodegeneration, tau-pathology or behavioural changes. We hypothesize that microstructural changes in the brain, due to extracellular amyloid deposits, can be traced in-vivo using DKI, an innovative magnetic resonance imaging (MRI) technique (1).

\textbf{Method:} We scanned APPPS1 (n=5) and control mice (n=5) on a 9.4T MR-system (Bruker). Mice were anaesthetized using isoflurane and the DKI protocol included the use of 30 gradient directions with 7 b-values. The collected images covered the total brain (30 slices, slice thickness 0.5mm). On DKI parameteric map (Matlab), regions of interest (ROI) were delineated in AMIRA (Mercury Computer systems). The choice of the ROI was hypothesis driven based on the outcome of histological analysis of the amyloid load through thioflavin-S staining after sacrificing the mice. Statistical differences were computed by means of the Mann-Whitney non-parametric statistical test in SPSS16.0 (SPSS Inc. Chicago, USA).

\textbf{Results:} We observed increased kurtosis in the cortex and hippocampus of the APPPS1 mice and a normal kurtosis for regions free of amyloid such as the cerebellum.

\textbf{Conclusion:} These results reinforce the hypothesis that DKI, which is a characterization for non-Gaussian diffusion distribution, is a more sensitive technique than his predecessor diffusion tensor imaging (DTI) (1). The observed increases in kurtosis parameters reflect the presence of amyloid which leads to a higher microstructural complexity in the brain.

1. Jensen et al. MRM, 2005