TOwards Imaging of Beta-Amyloid Deposits in Alzheimer Disease Using High-Field-MRI

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Introduction: In vivo imaging of brain pathology in elderly subjects is an important requirement for early detection of AD and potential therapeutic interventions e.g. by immunotherapy. Using High-Field-MRI techniques Aβ- deposits have been depicted in AD transgenic mice as well as in human post mortem brain samples.

Aims: To explore the potential of High-Field-MRI to detect beta-amyloid deposits and/or vessel abnormalities in brains of living subjects with AD.

Methods: In a pilot study three patients with mild to moderate AD and three healthy control subjects were studied. A T2* weighted sequence (TE 30 /TR 828 ms, duration 10:24 min, voxel 0.24 x0.24 x1.2 mm) was applied, using a 7 Tesla scanner with a 16 phased array coil. In addition a Time of Flight (TOF-) angiography was performed.

Results: Three of six investigated subjects experienced mild vertigo and one additional nausea. One AD subject dropped out because of noise intolerance during the scan. One control subject produced movement artefacts. Four images (two AD/CTR) were analysable. Hypointense foci in the hippocampus of one AD patient might be related to beta-amyloid deposits but also to microbleedings or other causes of susceptibility artefacts. TOF- angiography revealed in the AD patients a less homogenous signal of the vessel tree and a lower visibility of smaller vessels like lenticulostriate arteries compared to controls.

Conclusion: High-Field-MRI may constitute a powerful noninvasive tool to image brain pathology. The side effects still limit broader applications at this stage. Methodological refinements and histopathological validations are needed and ongoing.