

## **BASAL FOREBRAIN CHOLINERGIC SYSTEM: THE BETTER HIPPOCAMPUS IN ALZHEIMER'S DISEASE DIAGNOSIS?**

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**Introduction:** Hippocampus volumetry is considered to be the gold standard for structural marker in magnetic resonance imaging (MRI) based diagnosis or progress rating of Alzheimer's disease. Structural correlate of the cholinergic hypothesis in AD is the basal forebrain cholinergic system (BFCS), main source for acetylcholine for most parts of the neocortex. The BFCS is early affected in AD which makes it interesting for MRI based diagnosis. A subregional map of the BFCS in MNI space allows reliable detection of structural changes. Recent studies showed that morphometry of the BFCS exhibits early changes in AD patients.

**Methods:** High definition 3D MRI of the European DTI study in Dementia (EDSD) and 225 structural MRI and AV-45 PET amyloid imaging data from the Alzheimer's disease neuroimaging initiative (ADNI) were analysed using voxel-based morphometry and FreeSurfer Software for cortical thickness measurement.

**Results:** Receiver operating characteristic (ROC) showed a higher diagnostic accuracy for the BFCS compared to hippocampus with an area under the curve (AUC) of 0.88 vs. 0.84 in AD group and 0.86 vs. 0.77 in MCI group. MRI/PET comparison in cognitively healthy or mild impaired elderly participants observed a higher correlation of amyloid deposition and BFCS volumetry than amyloid deposition and hippocampus volumetry.

**Conclusion:** Structural changes of the BFCS can early be detected in the course of AD showing its emerging potential as important marker in AD diagnosis and therapy.