BASAL FOREBRAIN CHOLINERGIC VOLUME IN ALZHEIMER'S DISEASE

L. Zaborszky¹, B.A. Ardekani², J. DeLuca³, J.F. Sumowski³, G. Wylie³, Alzheimer's Disease Neuroimaging Initiative

¹Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark, NJ, ²Nathan S. Kline Institute for Psychiatric Research, Orangeburg, NY, ³Kessler Foundation Research Center, West Orange, NJ, USA

Neuropathological studies suggest that the basal forebrain cholinergic system (BFC) is affected in Alzheimer's disease (AD) and aging, although much controversy remains as to whether or not the neuropathological changes are primary and what the time course of changes is.

To test the hypothesis that BFC structural changes occur early in the disease and predict the conversion to AD, the volume of the cholinergic space from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database 3D T1-weighted high-resolution structural volume were estimated using the Automatic Registration Toolbox (ART) developed by Ardekani et al. (http://www.nitrc.org/projects/art) and the recently described postmortem probabilistic 3D atlas of the cholinergic space (Zaborszky et al., 2008).

From a group of female patients, aged 75-80 from the ADNI database we selected seven AD cases and randomly choose 12 controls. The Ch4 compartment was significantly reduced relative to normal subjects and baseline CH4 volume correlated with verbal memory decline in the Rey's Auditory Verbal Learning Test after a short delay (one-tailed t test, p< .05).

These preliminary results suggest that our automatic volume measurement procedure is sensitive enough to detect small volume differences in the cholinergic space. Further studies are necessary to confirm if specific volume changes in the cholinergic space in MCI and AD patients over time correlate with cognitive measures independent from the aging effect. These studies will ascertain whether BFC volume measurements in MRI can be used as a biomarker to select patient population at risk in which early intervention may slow the disease process.