

Knight ADRC Research Imaging Program  
The Adult Children's Study (ACS)

- NIH/NIA AG026276
- This is a longitudinal study of aging, beginning at age 45. Imaging includes MRI, amyloid PIB-PET, and tau T807 PET.
- Collaborators Andrei Vlassenko and Marc Raichle are also performing [15]O and FDG metabolic PET in this cohort; David Balota is performing task functional MRI.

Early brain changes in individuals who develop Dementia of the Alzheimer Type (DAT) are not well understood. Typically, DAT is diagnosed using neuropsychological performance testing and clinical evaluation. However, earlier work by our group and others identified a preclinical phase of DAT that's associated with changes in biomarkers. They are decreased levels of cerebral spinal fluid (CSF) and Abeta42 (AP42), increased fibrillar amyloid deposits in the brain, and increased atrophy, particularly within the hippocampus.

Although an interaction exists between these biomarkers and risk factors for DAT, the exact sequence of preclinical events and their effect on neuronal dysfunction that leads to DAT remains unclear. Recent advancements in MR imaging might provide useful information. These techniques - resting state functional connectivity MRI (fcMRI), diffusion tensor imaging (DTI), and arterial spin labeling (ASL) perfusion imaging -- could provide sensitive measures of neuronal function (fcMRI), cerebral blood flow (ASL) and white matter integrity (DTI). Repeated longitudinal measures using these neuroimaging techniques could give new information about the timeframe of the very earliest changes in brain function associated with DAT.

This project has three aims: correlate changes in neuronal structure using fcMRI, ASL and DTI in a cross-sectional analysis of age, APOE genotype, and biochemical and behavioral biomarkers; provide a temporal sequence of the changes in neuroimaging biomarkers; associate the rates of change in fcMRI, resting cerebral blood flow, and radial diffusivity in DTI measures with cognitive decline and changes in cortical amyloid load.