P3-111 THE PATTERN OF CEREBRAL HYPOMETABOLISM AND ITS ASSOCIATION WITH CLINICAL RATINGS IN COGNITIVELY NORMAL OLDER ADULTS WITH AND WITHOUT SIGNIFICANT FIBRILLAR AMYLOID BURDEN: FINDINGS FROM THE ALZHEIMER'S DISEASE NEUROIMAGING INITIATIVE

Hillary Protas[1], Kewei Chen[1], Cole Reschke[1], Auttawut Roontiva[1], Xiaofen Liu[1], Stephanie Parks[1], Wendy Lee[1], Robert Bauer, III,[1], Napatkamon Ayutyanont[2], Pradeep Thiyyagura[1], Robert Koeppe[3], William Jagust[4], Norman Foster[5], Michael Weiner[6], Adam Fleisher[1], Eric Reiman[1], Alzheimer's Disease Neuroimaging Initiative (ADNI)[7], *[1]Banner Alzheimer's Institute, Phoenix, Arizona, United States; [2]Banner Alzheimer's Institute; Arizona Alzheimer's Consortium, Phoenix, Arizona, United States; [3]University of Michigan, Ann Arbor, Michigan, United States; [4]University of California, Berkeley, Berkeley, California, United States; [5]University of Utah, Salt Lake City, Utah, United States; [6]University of California San Francisco, San Francisco, Utah, United States; [7]ADNI, San Diego, California, United States. Contact e-mail: hillary.protas@bannerhealth.com*

Background: It has been suggested that fibrillar amyloid- b (A b) begins to accumulate prior to regional cerebral metabolic rate for glucose (CMRgl) and clinical declines. In this study, a voxel-based partial least squares (PLS) algorithm was used to 1) characterize the CMRgl pattern that best distinguished cognitively normal "fibrillar Aβ positive and negative" older adults from the Alzheimer's Disease Neuroimaging Initiative (ADNI), 2) compare the resulting FDG PET PLS subject scores in the Aβ positive and negative subjects, and 3) compare the extent to which these scores were associated with lower clinical ratings in each of the two subject groups. **Methods:** A b positivity was characterized in 225 cognitively normal subjects, 76 $\pm$ 6 years of age, using a mean cortical-to-cerebellar florbetapir SUVR threshold previously found to be associated with moderate or frequent neuritic plaques (Fleisher et al., 2011). A PLS routine in SPM environment was used to characterize the CMRgl pattern that best distinguished the resulting 71 Aβ positive and 154 Aβ negative subjects, characterize and compare their resulting FDG PET PLS subject scores, characterize and compare the extent to which the PLS scores were associated with clinical decline using the MMSE or ADAS-Cog, and determine the extent to which findings were solely attributable to fibrillar Aβ burden or APOE e 4 gene dose in each subject group. **Results:** The CMRgl pattern that best distinguished the Aβ positive from Aβ negative subjects included significantly lower measurements in posterior cingulate, parietal, and temporal regions. The resulting FDG PET PLS scores were significantly different in the Aβ positive and negative groups (p=8e-12). They were significantly associated with poorer MMSE and ADAS-Cog scores in the Aβ positive group(r=-0.50, p=9.1e-6; r=0.52,p=3.0e-6) but only significant for ADAS-cog in the Aβ negative group(r=0.16,p=0.05). The PLS score associations with MMSE or ADAS-Cog were stronger in the Aβ positive than in Aβ negative subjects (p=4.3e-4,p=2.2e-3). These results remained after correction for fibrillar A b or APOE- e 4 gene dose. **Conclusions:** Fibrillar A b burden in cognitively normal older adults is associated with a characteristic pattern of cerebral metabolism, and the metabolic pattern in those with fibrillar Aβ positive had stronger associations with poorer clinical ratings.

P3-112 PATTERNS OF REGIONAL BRAIN ATROPHY AND AMYLOID DEPOSITION IN ALZHEIMER'S DISEASE

Ranjan Duara[1], Warren Barker[2], David Loewenstein[3], Qian Shen[4], Maria Greig-Custo[1], Daniel Varon[1], Melissa Murray[5], Dennis Dickson[5], *[1]Mount Sinai Medical Center, Miami Beach, Florida, United States; [2]Mount Sinai Medical Center, Miami Beach, Florida, United States Virgin Islands; [3]Miller School of Medicine, University of Miami, Miami, Florida, United States; [4]University of Miami, Miller School of Medicine, Miami, Florida, United States; [5]Mayo Clinic, Jacksonville, Florida, United States. Contact e-mail: duara@msmc.com*

Background: Similar to recently described pathological subtypes of AD (Murray et al., 2011), MRI-based subtypes of AD and MCI in the ADNI cohort have been identified. These subtypes have distinguishable cognitive features, APOE e4 allele frequencies and rates of progression. The relationship of these subtypes to amyloid positive (Amy+ve) or negative (Amy-ve) status was assessed in this study. **Methods:** All subjects were participants in the ADNI-1 clinical trial: 91 elderly normal controls (EN); 125 subjects with amnestic MCI (aMCI); and 16 subjects with probable AD (AD). Their data was downloaded from the ADNI web-site. An SUVR of 1.50+ was used to classify subjects as Amy+ve. Using brain volumes calculated from FreeSurfer, three patterns of brain atrophy were identified: Limbic, Neocortical-1 (NeoC-1) and Neocortical 2 (NeoC-2), as shown in the Figure. Subjects with any of these three atrophy patterns were designated MRI+ve.The relationships between baseline MRI atrophy pattern, cognitive statusand amyloid status were explored using Chi-Square analyses. General linear models were used toexplore the relationship between baseline MRI subtype, amyloid status andchange in cognitive score over 24 months. **Results:** The most common MRI subtype amongAD subjects was NeoC-1, among aMCI was Limbic and among EN was NeoC-2. Amy+ve scans were present in 37% ofEN, 68% of aMCI and 94% of AD subjects. Among cognitively impaired subjects (aMCI and AD combined),there was a trend for Amy+ve scans to be more prevalent in NeoC-1 (92%)than in other atrophy subtypes (67%). Among cognitively impaired subjects, Amy+ve and MRI+ve status were each associated with about a 2-point faster decline in LM scores; this relationship was additive (p=.01). Amy+ve status, but not MRI+ve status, was related to a faster decline on Trail B. **Conclusions:** Amyloid deposition is greater among NeoC-1 in the early stages of AD. Both Amy+ve and MRI+ve status at baseline predict change in memory scores in two years, in an additive manner. Only Amy+ve status predicts progression in Trails B scores.

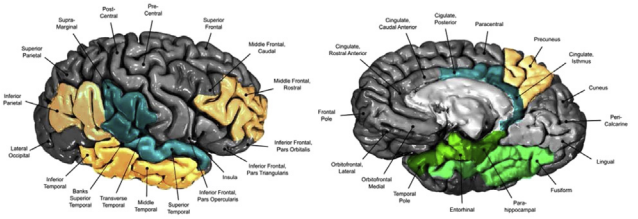

Figure 1. Pattern of regional brain atrophy. Limbic (LB) Pattern depicted in green includes the following regions: entorhinal cortex, parahypocampal gyrus, temporal pole, fusiform gyrus. Hippocampus and amygdala are part of this pattern of atrophy but are not seen in the figure. Neocortical Type 1 (NC-1) Pattern depicted in yellow includes the following regions: inferior parietal, precuneus, middle and inferior temporal and rostral middle frontal. Neocortical Type 2 (NC-2) Pattern depicted in blue includes the following regions: traverse temporal, superior temporal, insula, superamarginal gyrus and posterior/isthmus cingulate. Cortical regional based on Desikan RS et al. Neuroimage 2006.

P3-113 EFFECTS OF CHANGING FROM NON-ACCELERATED TO ACCELERATED MRI IN BRAIN ATROPHY MEASUREMENT

Kelvin Leung[1], Felix Woodward[2], Paul Thompson[3], Nick Fox[4], *[1]UCL Institute of Neurology, London, United Kingdom; [2]University College of London, London, United Kingdom; [3]UCLA, Los Angeles, California, United States; [4]UCL Institute of Neurology, London, United States. Contact e-mail: kkleung@ucl.ac.uk*

Background: Rates of brain atrophy from serial MRI are increasingly used to track disease progression for diagnostic purposes and clinical trials. Stability of acquisition is regarded as absolutely essential (a sine qua non) for reliability, with each individual ideally being scanned in the same scanner, using the same software and the same sequence. This may be difficult when studies go on over many years. One attractive recent advance in MRI is to speed up acquisition using parallel imaging methods (e.g. reducing 3D-T1w acquisition from $\sim$9 to $\sim$5 minutes). In some studies, follow-up scans may occasionally be accidentally acquired with an accelerated acquisition.