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The Contribution of Blood Serum Biomarkers to the Prediction of Cognitive Decline by fMRI and Apolipoprotein-E in Healthy Older Adults

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LONG-TERM MEMORY: Development & aging

**D54**
INTER-INDIVIDUAL VARIABILITY IN CRITERION SHIFTING ACROSS THE LIFESPAN

Brian Lopez1, Craig Bennett1, Tyler Santander2, Michael Miller1; 1University of California, Santa Barbara - A critical aspect of recognition memory is the integration of available memory evidence and a decision criterion. Previous work has shown that a wide range of factors can affect the placement of a decision criterion, including cognitive and personality factors. In this study we attempted to quantify the impact of aging on criterion placement during episodic recognition. To that end, we used fMRI to examine recognition behavior and regional brain activity in 30 young adults (23-35 yrs) and 30 elderly subjects (60-75 yrs) during a task involving criterion shifting. Subjects were first asked to encode 150 words for later recognition. The words were then presented alongside new, unobserved words in conditions of high target probability (70% old, 30% new) and low target probability (30% old, 70% new). Subjects had to decide for each word whether it was a target old word or a non-target new word. The results demonstrated that target discrimination ability (d-prime) was lower in the elderly group, and that the elderly group showed increased variability in the degree of criterion shifting between the two probability conditions. We also found that the elderly group had significantly increased inter-individual variability in regional brain activity relative to the young adult group while performing the task. The results suggest that aging is associated with increased variability in criterion shifting and in the regional brain activity that accompanies such criterion shifts.

**D55**
THE CONTRIBUTION OF BLOOD SERUM BIOMARKERS TO THE PREDICTION OF COGNITIVE DECLINE BY FMRI AND APOLIPROPROTEIN-E4 IN HEALTHY OLDER ADULTS

Kristy A. Nelson1,2, Michael A. Sugarman3, John L. Woodard4, Michael Seidenberg4, J. Carson Smith5, Sally Durgerian6, Stephen M. Rao7; 1Marquette University, 2Medical College of Wisconsin, 3Wayne State University, 4Rosalind Franklin University of Medicine and Science, 5University of Maryland, 6Cleveland Clinic - Apolipoprotein E (APOE) 4 allele carriers demonstrate greater risk for cognitive decline and Alzheimer’s disease than non-carriers. However, factors associated with risk of decline among APOE 4 carriers are not well-known. In this longitudinal study, we investigated whether discrete aspects of baseline episodic memory performance and structural (sMRI) and functional (fMRI) magnetic resonance imaging were associated with cognitive decline in older APOE 4 carriers and non-carriers. Seventy-eight healthy older adults underwent cognitive testing at baseline and after 18 months, baseline serum APOE genotyping, manually-traced hippocampal volume measurement from sMRI, and task-activated fMRI. Cognitive decline was defined as a one SD or greater reduction from baseline on at least one of three cognitive measures at follow-up (i.e., Auditory Verbal Learning Test [AVLT] Delayed Recall and Trials 1-5 Sum, Mattis Dementia Rating Scale-2 Total Score). Declining APOE 4 carriers (n=14) exhibited reduced hippocampal volume (p<.009) and fMRI semantic processing activity in cortical (p<.04) and hippocampal (p<.05) regions relative to stable carriers (n=12). On the AVLT, declining APOE 4 carriers showed greater baseline susceptibility to retroactive interference (p=.006), intertrial forgetting (lost access; p<.001) and recognition false alarms (p<.05) compared to stable carriers. Stable (n=59) non-carriers showed slightly more susceptibility to proactive interference than declining (n=13) non-carriers (p=.02). Along with sMRI and fMRI, AVLT measures of rapid forgetting can help to identify APOE 4 carriers with elevated risk for cognitive decline. These effects appear to be largely unique for APOE 4 carriers, perhaps due to preclinical structural and functional alterations in structures subserving memory.

**D56**
EPISODIC MEMORY MEASURES COMPLEMENT STRUCTURAL AND FUNCTIONAL MRI FOR PREDICTING COGNITIVE DECLINE IN APOLIPROPROTEIN E4 CARRIERS

John L. Woodard1, Michael Seidenberg2, Kristy A. Nelson1,2, Michael A. Sugarman3, J. Carson Smith4, Sally Durgerian5, Alissa M. Butts6, Melissa A. Lancaster7, Mary K. Foster8, Nathan C. Hanke9, Monica A. Matthews2, Stephen M. Rao3;1Wayne State University, 2Rosalind Franklin University, 3Marquette University, 4University of Maryland, 5Medical College of Wisconsin, 6The Cleveland Clinic - Apolipoprotein E (APOE) 4 allele carriers demonstrate greater risk for cognitive decline and Alzheimer’s disease than non-carriers. However, factors associated with risk of decline among APOE 4 carriers are not well-known. In this longitudinal study, we investigated whether discrete aspects of baseline episodic memory performance and structural (sMRI) and functional (fMRI) magnetic resonance imaging were associated with cognitive decline in older APOE 4 carriers and non-carriers. Seventy-eight healthy older adults underwent cognitive testing at baseline and after 18 months, baseline serum APOE genotyping, manually-traced hippocampal volume measurement from sMRI, and task-activated fMRI. Cognitive decline was defined as a one SD or greater reduction from baseline on at least one of three cognitive measures at follow-up (i.e., Auditory Verbal Learning Test [AVLT] Delayed Recall and Trials 1-5 Sum, Mattis Dementia Rating Scale-2 Total Score). Declining APOE 4 carriers (n=14) exhibited reduced hippocampal volume (p<.009) and fMRI semantic processing activity in cortical (p<.04) and hippocampal (p<.05) regions relative to stable carriers (n=12). On the AVLT, declining APOE 4 carriers showed greater baseline susceptibility to retroactive interference (p=.006), intertrial forgetting (lost access; p<.001) and recognition false alarms (p<.05) compared to stable carriers. Stable (n=59) non-carriers showed slightly more susceptibility to proactive interference than declining (n=13) non-carriers (p=.02). Along with sMRI and fMRI, AVLT measures of rapid forgetting can help to identify APOE 4 carriers with elevated risk for cognitive decline. These effects appear to be largely unique for APOE 4 carriers, perhaps due to preclinical structural and functional alterations in structures subserving memory.

**D57**
ITEM AND ASSOCIATIVE MEMORY FOR NOVEL NATURALISTIC ACTIONS IN AMNESTIC MILD COGNITIVE IMPAIRMENT, OLDER ADULTS, AND YOUNGER ADULTS

David A. Gold1, Norman W. Park2, Angela K. Troyer1,4, Kelly J. Murphy1,2,3, Joseph and Kathleen Bryan Alzheimer's Disease Research Center, Duke University Medical Center, 1Baycrest Centre, York University, 2University of Toronto - Most research examining associative memory has focused on memory for non-naturalistic, laboratory-based stimuli. We extend current findings by exploring item and associative memory for novel naturalistic actions (NNA; e.g., how to make an art-and-crafts project such as a wind-speed indicator). Based on previous research using laboratory tasks, a selective decline in memory for associative information (e.g., was this tool used with this object?) relative to item information (e.g., was this object presented?) was predicted in amnestic mild cognitive impairment (aMCI) and aging. Individuals with aMCI (n=24), age-matched older adults (n=24), and undergraduates (n=32) viewed two 90 second NNA videos. Following a 90 second distractor task, participants completed forced-choice recognition memory tests of item and associative memory for the NNAs. A mixed ANOVA with the within-subjects factors of question type (item, associative) and response type (hits, false alarms), and the between-subjects factor of group (young, old, aMCI), revealed no significant interaction [F(2, 77) = 0.870, p = .233], contrary to previous findings with other stimuli that demonstrates older adults, and those with impaired memory, show selective decline in associative memory. A response type by group interaction confirmed the aMCI group had higher false alarms overall [F(2, 77) = .070, p < .001, 2p = .351], but no differences between younger and older adults. Further, the three groups did not differ in overall hit rate. The findings support protected encoding of within-domain associa-