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Longitudinal Associations between Physical Activity, Cognitive Status, and Brain Function in Older Adults at Genetic Risk for Alzheimer's Disease

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specific emotional memories without explicit retrieval instructions. Neural activity during young and older adults' positive and specific autobiographical memories were compared, focusing on regions preferentially engaged in older adults' memory retrieval. Preliminary analysis suggests that young and older adults rely on distinct cognitive and neural mechanisms during retrieval of autobiographical memories. Understanding how healthy aging influences older adults' autobiographical memory retrieval provides valuable insight into how memory representations change with time, experience, and cognitive manipulations. As autobiographical memory is particularly important to older adults' daily functioning and sense of well being, this information may be invaluable for the aging population.

B45

LONGITUDINAL ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY, COGNITIVE STATUS, AND BRAIN FUNCTION IN OLDER ADULTS AT GENETIC RISK FOR ALZHEIMER'S DISEASE J Carson Smith[1,2], Sally Durgerian[2], John L. Woodard[3], Kristy A. Nielson[4,2], Alissa M. Butts[4], Nathan Hantke[4], Michael Seidenberg[5], Melissa A. Lancaster[5], Monica Matthews[5], Michael A. Sugarman[3], Stephen M. Rao[6]; [1]University of Maryland, [2]Medical College of Wisconsin, [3]Wayne State University, [4]Marquette University, [5]Rosalind Franklin University of Medicine and Science, [6]Cleveland Clinic – The apolipoproteinE epsilon4 (APOE-?4) allele is associated with cognitive decline in old age and is a risk factor for Alzheimer's disease (AD). Physical activity (PA) is associated with a reduced risk of incident cognitive impairment, particularly among APOE-?4 carriers. We recently reported greater semantic memory related brain activation in cognitively intact physically active (High PA) APOE-?4 carriers compared to physically inactive (Low PA) ?4 carriers and non-carriers (Smith et al., 2011). Here, we compared longitudinal changes in semantic memory-related brain activation in High PA and Low PA APOE-?4 carriers. Thirty-two older ?4 carriers completed neuropsychological testing and a fMRI semantic memory task (famous name discrimination) at baseline and after 18 months. All participants were cognitively intact at baseline and were classified as High PA (n = 16) or Low PA (n = 16) based on self-report. After 18 months, 5 of 16 High PA and 13 of 16 Low PA were classified as cognitively declining by at least 1 SD decrease in neurocognitive performance (Group difference, p = .011, Fisher's exact test). A fROI analysis of the fMRI data and repeated measures ANOVAs revealed significant Group by Time interactions for intensity of semantic memory-related activation. Significantly greater activation at baseline in the High PA group was attenuated over time (no change in Low PA) and resulted in no group differences at the 18-month follow-up. These findings suggest that greater PA at baseline is associated with greater cognitive stability over 18-months in APOE-?4 carriers and reduced neural activation during fame discrimination.

B46

CEREBRAL AND VASCULAR FACTORS MAY PREDICT MEMORY PERFORMANCE IN HEALTHY AND PATHOLOGICAL AGING Jil Humann[1], Anouk Vermeij[1,2], Arenda H.E.H. van Beek[2], Ondine van de Rest[2], Jurgen A.H.R. Claassen[1,2], Roy P.C. Kessels[1,2]; [1]Radboud University Nijmegen, Donders Institute for Brain, Cognition and Behaviour, The Netherlands, [2]Radboud University Nijmegen Medical Centre, Alzheimer Centre Nijmegen, The Netherlands – Aging is associated with several changes to the structure and function of the brain and vasculature. This study aimed to investigate the relationship between cerebral and vascular factors that may play a role in the development of Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD), and associated cognitive impairments. Participants were 27 healthy older adults (76.3±4.1 years), 21 MCI patients (71.8±9.2 years) and 22 AD patients (73.0±6.8 years). We rated the degree of medial temporal lobe (MTL) atrophy on coronal T1-weighted MRI, and white matter hyperintensities on transverse T2-FLAIR MRI images. We measured blood pressure (BP) and cerebral blood flow velocity (CBFV, Transcranial Doppler) under resting conditions, and calculated cerebrovascular resistance (CVR). Additionally, participants performed the Dutch equivalent of the Rey auditory verbal learning task. Preliminary results showed that both structural and vascular measures predict memory performance. Specifically, when corrected for age and education, low performance on the memory task was associated with high rates of atrophy (r= -.588) and white matter degeneration (r= -.450) as well as higher CVR (r= -.314). AD patients compared to healthy controls exhibited higher rates of both MTL atrophy and white matter lesions. Furthermore, CVR was higher in patients (both MCI and AD) than in controls. Since we did not observe differences in CBFV between groups, this seems to be related to heightened mean BP in the patient group. These results suggest reciprocal interactions between structural pathology, vascular changes and cognitive performance during aging and support the idea that cerebrovascular dysfunctions may cause AD.

B47

ROLE OF RECOLLECTION IN EPISODIC FEELING-OF-KNOWING ACCURACY IN YOUNG AND OLDER ADULTS Michel Isingrini[1], Audrey Perrotin[1], Celine Souchay[1], Laurence Taconnat[1], Mathilde Sacher[1], Badiaa Bouazzaoui[1]; [1]University of Tours, France – In feeling of knowing (FOK) studies, participants predict subsequent recognition memory performance on items initially encoded but that cannot be recalled. This study examined the hypothesis that FOK accuracy may be influenced by the recollection of contextual information related to the unrecalled target by asking participants to indicate whether the information on which they based their prediction of future recognition was related or not to the contextual episode of learning. Such procedure enabled to distinguish two type of episodic FOK accuracy, associated to the recollection of the context information (R-FOK) or not (NR-FOK). In addition, we tested whether the episodic FOK accuracy deficit demonstrated by older adults could be reduced. Results confirmed that R-FOK accuracy was significantly higher than NR-FOK accuracy confirming that the recollection of contextual information enhanced episodic FOK. However, this was not the case for older adults indicating that, contrary to the younger adults, they do not benefit from this recollection effect. This suggests a lack in older adults in the quality of contextual details retrieved pertaining to the unrecalled target that are required to make accurate FOK judgments.

B48

SLEEP-DEPENDENT MEMORY CONSOLIDATION IN OLDER ADULTS - A PILOT STUDY Kathryn Atherton[1], Christopher Butler[1], Anna C Nobre[1]; [1]University of Oxford – There is now a large body of evidence demonstrating that sleep plays a role in memory consolidation. The overwhelming majority of these studies have used young adults as participants. There is evidence to suggest that there may be a decline in sleep-dependent memory consolidation with age. Here we present data showing that sleep is very beneficial for memory even in older adults (mean age 59±1.65). Participants learnt new arbitrary associations between pairs of word stimuli. Memory was tested twelve hours later following a night of sleep or a day of wake. Interfering pairs of words were learnt ten minutes before the memory test. This interference learning has been shown in previous studies with young adults to 'unmask' the benefit of sleep for memory. Each participant took part in both conditions and the order was counterbalanced. Retention was significantly better in the sleep condition than the wake condition. Learning was not significantly different in the two conditions, arguing against a circadian interpretation of the data.

B49

AGE-RELATED AND GENETIC EFFECTS ON FUNCTIONAL REORGANIZATION OF MEMORY SYSTEMS Nicolas Schuck[1,2], Peter Frensch[1], Shu-Chen Li[2]; [1]Humboldt-Universität zu Berlin, [2]Max-Planck Institute for Human Development, Berlin – Aging research shows that some forms of memory are more affected by aging than others. Intriguingly, this research has revealed a mismatch between age-related behavioral and neurophysiological decline for the habitual/procedural and declarative memory systems: behaviorally the former exhibits smaller age-related decline than the later, while negative effects of aging on the associated