IC-01-03 PARTICIPATION IN COGNITIVELY STIMULATING ACTIVITIES IS ASSOCIATED WITH BRAIN STRUCTURE AND COGNITIVE FUNCTION IN PRECLINICAL ALZHEIMER'S DISEASE

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Background: Prior studies have shown that participation in cognitively-stimulating activities might delay the onset of Alzheimer's disease (AD). However, the mechanism underlying this effect is not well understood. In this study, we tested the hypothesis that frequent participation in cognitively-stimulating activities, specifically those related to playing games and puzzles, favorably alters brain structure and cognition in a sample of middle-aged adults at increased risk for AD. **Methods:** Three hundred twenty-nine cognitively normal, middle-aged adults (age=60.31±6.25 years, 69% women, 40% APOE4 positive, and 74% with family history of AD) enrolled in the Wisconsin Registry for Alzheimer's Prevention participated in this study. They reported their current engagement in cognitive activities using a modified version of the Cognitive Activity Scale (CAS), underwent a structural MRI scan, and completed a comprehensive cognitive battery. FreeSurfer was used to derive gray matter (GM) volumes from AD-related regions of interest (ROIs), and composite measures of episodic memory and executive function were obtained from the cognitive tests. Covariate-adjusted least squares analyses were used to examine the association between the Games item on the CAS (CAS-Games) and both GM volumes and cognitive composites. **Results:** Higher scores on CAS-Games were associated with greater GM volumes in several ROIs including the hippocampus, posterior cingulate, anterior cingulate, and middle frontal gyrus (p's<.04). Similarly, CAS-Games scores were positively associated with scores on the Immediate Memory, Verbal Learning & Memory, and Speed & Flexibility domains (p's<.02). These findings were not modified by known risk factors for AD, including age, APOE4, and family history of AD. In addition, the Total score on the CAS was not as sensitive as CAS-Games to the examined brain and cognitive measures. **Conclusions:** Engagement in cognitively-stimulating activities is associated with increased brain volume and higher cognitive test scores in middle-aged adults at risk for AD. These findings suggest that, for some individuals, participation in cognitive activities pertinent to game playing may help prevent AD by preserving brain structures and cognitive functions vulnerable to AD pathophysiology. More detailed studies investigating the effects of specific gaming activities would help further our understanding of how an active lifestyle might help delay the development of AD.

IC-01-04 VASCULAR RISK FACTORS IMPACT COGNITION INDEPENDENT OF PIB PET AND MRI MEASURES OF AD AND VASCULAR BRAIN INJURY

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Background: Alzheimer's and vascular disease are two common causes of cognitive decline among older individuals. The recent advent of amyloid imaging in combination with MRI markers of vascular brain injury and AD-associated neurodegeneration and detailed medical history allows for in vivo assessment of the combined influence of vascular and Alzheimer' s disease on cognitive decline. Recent work by our group finds evidence that vascular brain injury is significantly associated with cognitive ability independent of amyloid load among individuals selected for high vascular risk 1, 2. We extended this work by examining the impact of vascular risk factors, vascular brain injury, AD-associated neurodegeneration, and amyloid load in a community based cohort more representative of the general population. **Methods:** The study consisted of 65 subjects aged 73.2 + 7.2 years of age, 65% of whom were Caucasian, 17% Hispanic, 14% African American and 4% Asian with mean educational achievement of 15.5 + 3.3 years; 54% were female and 57% cognitively normal, 38% mild cognitively impaired 5% were demented at baseline assessment. Subjects received yearly psychometrically matched measures of memory and executive function over 5.2 + 2.3 years. A history of hypertension, diabetes, elevated cholesterol, coronary artery disease, or cerebrovascular disease was assessed at baseline evaluation and 79% had one or more risk factor, with a median of 2. All subjects underwent PiB PET imaging quantified using a distribution volume ratio with cerebellar

Table

	Episodic Memory			Executive Function		
Variable	Estimate	Std Error	Prob>|t|	Estimate	Std Error	Prob>|t|
Intercept	-0.695765	1.491768	0.6429	-1.288254	1.017152	0.2115
Time	-0.018035	0.047031	0.7021	-0.018371	0.032862	0.5771
Education	0.0736248	0.028469	0.0128*	0.0896571	0.019485	<.0001*
Dx[Demented]	0.0956777	0.358098	0.7900	-0.104587	0.244562	0.6700
Dx[MCI]	-0.497818	0.198377	0.0142*	-0.138016	0.135823	0.3129
Time*Dx[Demented]	0.1214084	0.087934	0.1697	0.0778725	0.062235	0.2125
Time*Dx[MCI]	-0.052757	0.047178	0.2656	-0.063648	0.033445	0.0590
Baseline Age	-0.012767	0.014517	0.3834	-0.016105	0.009934	0.1116
Global PiB DVR	-1.173637	0.373716	0.0027*	-0.191387	0.255029	0.4564
Time* Global PiB DVR	-0.229223	0.073818	0.0031*	-0.143367	0.048869	0.0058*
Hippocampal Volume	371.5397	140.2651	0.0109*	289.92276	96.18849	0.0042*
Time* Hippocampal Volume	13.263985	23.2546	0.5719	38.80356	15.05114	0.0167*
Vascular Burden	-0.138457	0.075923	0.0744	-0.127056	0.052021	0.0185*
Time* Vascular Burden	-0.00711	0.012867	0.5839	0.0093575	0.008315	0.2714
Hyperlipidemia	0.2122436	0.088242	0.0199*	0.1010828	0.064604	0.1242
Time* Hyperlipidemia	0.0234361	0.015491	0.1385	-0.002628	0.01073	0.8085