[1]Drexel University, Philadelphia, PA, USA.
[2]Feinstein Institutes for Medical Research, Manhasset, NY, USA

Objective: Memory is a critical piece of the human experience and impairments in neural memory networks can have devastating consequences for the affected person. A subtype of memory, episodic memory generates context for the present based on past experience and allows us to make predictions about the future. Episodic memories become stable fixtures through long-term memory consolidation. It is believed that consolidation of episodic memory requires a dynamic interplay between connected hippocampal-cortical networks, mainly during sleep. Sleep oscillations, slow oscillations and thalamocortical spindles, coupled with hippocampal sharp wave ripples (SWR) is proposed to be mechanistically involved in establishing the crucial cortical-subcortical dialog. The current study aimed to determine alterations in typical sleep oscillations and oscillation coupling in patients with and without structural hippocampal damage and correlate them with neuropsychological measures believed to be sensitive to hippocampal dysfunction, i.e., Rey Auditory Verbal Learning Task (RAVLT) and Verbal Paired Associates (VPA-II).

Participants and Methods: We used intracranial electroencephalography (iEEG) in 14 patients with epilepsy to directly record hippocampal and neocortical oscillations and neuropsychological measures obtained prior to implantation. Half of the participants were diagnosed with mesial temporal sclerosis (MTS) in the left hippocampus and healthy tissue in the right hippocampus. The other half did not have MTS and had either mesial temporal epilepsy without MTS or extra-temporal seizures. We analyzed hippocampal SWR output from both hippocampi and characterized neocortical slow oscillations and spindles and their coupling for each participant. We correlated electrophysiological data with behavioral results of neuropsychological testing in order to characterize the clinical relevance.

Results: SWR analysis revealed significant differences in the frequency, $t(7639) = 15.52$, $p>.001$, $p > .001$), amplitude, $t(7664) = -23.93$, $p > .001$, and waveforms ($p > .001$) of SWR in the sclerotic versus healthy hippocampi. Patients with a sclerotic hippocampus but relatively preserved verbal memory scores (RAVLT, VPA-II) showed increased SWR amplitudes in the contralateral hippocampus compared to patients with low verbal memory scores. Additionally, we found differences between hemispheres in phase amplitude coupling of SWRs to spindles and SOs ($p > 0.001$). Results of our correlational analysis were variable and dependent upon additional factors, such as age of onset and diagnosis duration.

Conclusions: Results from this work will aid in establishing a criterion for characterizing a relationship between subcortical and cortical oscillations as they relate to memory performance. Besides aiding our understanding of the neural mechanisms underpinning memory consolidation this will ideally help with developing neurophysiological biomarkers that may predict possible memory decline in resective or ablative neurosurgery absent of structural lesion. In addition, this work may potentially provide first evidence of a neurophysiological biomarker directly recorded from the human hippocampus to support possible reorganization of memory functioning in the non-sclerotic hippocampus.

Categories: Neurophysiology/EEG/ERP/fMRI
Keyword 1: memory disorders
Keyword 2: epilepsy / seizure disorders - surgical treatment
Keyword 3: electroencephalography
Correspondence: Elizabeth Espinal, Drexel University, ee396@drexel.edu

---

6 Kynurenine/Tryptophan Ratio Moderates the Relationship Between Adiposity and Verbal Memory in Midlife

Cherry Youn[1], Barbara Strasser[2], Dietmar Fuchs[3], Hirofumi Tanaka[1], Andreana P Haley[1]
[1]The University of Texas at Austin, Austin, Texas, USA. [2]Sigmund Freud University Vienna, Vienna, Austria. [3]Innsbruck Medical University, Innsbruck, Austria

Objective: Tryptophan is an essential amino acid and precursor to several compounds of neurobiological significance, including serotonin, melatonin, and nicotinamide adenine dinucleotide. However, the tryptophan-kynurenine metabolic pathway exhibits "double-edged sword" effects on neurons with

neuroprotective metabolites and neurotoxic intermediates. Given its involvement in neurodegenerative diseases and recent reports of alterations in the pathway in response to obesity, we set out to investigate the potential moderating effect of the kynurenine/tryptophan ratio (KTR) on the relationship between adiposity and verbal memory performance in midlife. Our study is important in providing insight into mechanisms underlying the association between adiposity and cognition through the life course and sheds light on the role of metabolic risk factors before senescence. With the current epidemic of obesity and the expected age-related increase in dementia incidence, even a small association between obesity and cognitive decline may have far-reaching public health implications.

Participants and Methods: A total of 110 middle-aged adults aged 40-61 years participated in this cross-sectional study. Serum levels of kynurenine and tryptophan, body adiposity measured through bioimpedance, and non-contextual verbal memory performance on the California Verbal Learning Test, Second Edition (CVLT-II) were evaluated. Using factor analysis, the composite score of memory indices from Short Delay Free Recall, Long Delay Free Recall, and Long Delay Recognition tasks were calculated. We used linear regression models with the interaction between KTR and adiposity. Sex, age, years of education, and physical activity were included as covariates, as they predict cognitive performance.

Results: Higher KTR was associated with greater adiposity ($p < 0.01$). Linear regression analyses for assessing interaction effects indicated that KTR moderated the relation between adiposity and composite memory score ($F_{(7, 100)} = 5.22$, $p < 0.001$, $R^2 = 0.27$). These results were robust across individual memory indices and composite memory scores. These findings remained significant even with adjusting for relevant covariates. Interestingly, the marginal effects of adiposity on composite memory score were estimated to be statistically significant and negative (higher adiposity = poorer memory) only when KTR was low (< 0.03).

Conclusions: The present study indicates that KTR may influence the association between adiposity and verbal memory in midlife as KTR moderated the relationship between adiposity and composite memory score even after adjusting for relevant covariates. In contrast to the notion that high KTR is related to increases in neurotoxic metabolites such as quinolinic acid, individuals with high adiposity and low KTR exhibited the weakest memory performance. Unfortunately, our study did not include measurements of quinolinic acid or kynurenic acid, which may have neuroprotective and anti-inflammatory properties. Future studies expanding the number of measured KT metabolites could shed light on the interactions between obesity and KTR on memory function in midlife.

Categories: Other
Keyword 1: cognitive functioning
Keyword 2: memory: normal
Correspondence: Cherry Youn, The University of Texas at Austin, youncherry@utexas.edu

Paper Session 16: Neurology | Neuroanatomy | HIV

3:30 - 4:55pm
Friday, 3rd February, 2023
Pacific Ballroom E

Moderated by: Lucette Cysique

---

1 Moral Reasoning in Individuals with Agenesis of the Corpus Callosum

Edita Shahnazarian[1], Kutter D Callaway[1], Lynn K Paul[2], Warren S Brown[1]
[1]Travis Research Institute, Fuller Graduate School of Psychology, Pasadena, CA, USA.
[2]California Institute of Technology, Pasadena, CA, USA

Objective: Previous research has demonstrated that individuals with Agenesis of the Corpus Callosum (AgCC), the congenital absence of all or part of the corpus callosum, exhibit a pattern of cognitive and psychosocial deficits, even with a FSIQ in the normal range (FSIQ > 80; Brown & Paul, 2019). This includes a core deficit in their complex reasoning and novel problem-solving (Brown & Paul, 2019), with secondary deficits in capacity to imagine complex emotional/cognitive consequences of potential actions involving others (Young et al 2019), deficits in emotion