Hawaii's ANNE (Alzheimer's Neural Network EEG) Lab AI Machine Learning Research presented at Tokyo September 2024 AAIC (Alzheimer's Association International Conference) Advancements in Modernizing Diagnosis

The Hawaii Memory Disorders Center & Hawaii ANNE (Alzheimer's Neural Network EEG) Lab collaborates with the Advance Brain Monitoring to look at Real-world point of care EEG/ERP biomarker platform for assessment of the neurophysiological deficits in individuals with Mild Cognitive Impairment.

2024 ANNE Research Team (Front- University Hawaii medical students Michael Read, Janette Keola, Kirra Borrelo, Nathan Kim Neurologist Kore Kai Liow, MD, Shay Nakahira, Kaylie Yamauchi, Sarah Hogue, (back row research Staff) Kelly Asahi, Jason Edwards, Sam Kim, John Seib, Qi Zhi, DNP, MPH, Ena Zhu)
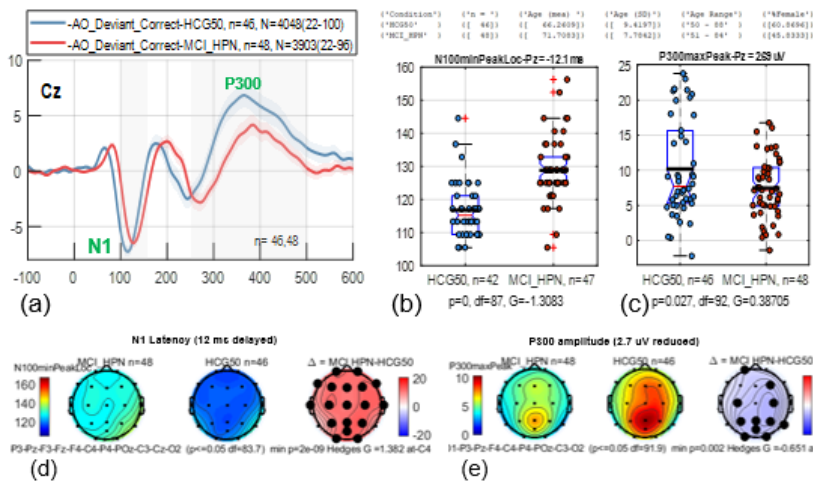
BEAM (Biomarker based Electrophysiology Advanced Brain Monitoring) a proven EEG platform developed using machine learning AI algorithms to map the progression of cognitive decline across the dementias. BEAM™ platform (wireless, FDA-cleared EEG system integrated with time-synchronized computer-based neurocognitive testing) was used to assess resting state EEG (eyes-open and eyes-closed, 5-min each) and ERPs in auditory oddball (AO), image recognition memory (SIR), and sustained attention tasks (3 choice vigilance: 3CVT). Pre-defined EEG/ERP measures were reported for each patient in percentiles relative to age-matched normative data. MCI patients exhibited an average 12 ms delay in early processing of auditory stimuli, as measured by N1 latency ($p<0.001$, ES=1.3, df = 87) and 2.7µV reduction of the P300 amplitude ($p<0.03$, ES = 0.4, df=92). In resting state eyes closed, MCI patients exhibited elevated theta power (average ES=0.27) that reached statistical significance (uncorrected) in limited number of channels (e.g. $p<0.05$, ES=0.36 at F4).

These results suggest a possible diagnostic role for point-of-care, rapid-setup EEG/ERP assessment platforms at an individual level. Unlike molecular diagnostic biomarkers of neurodegenerative disease, EEG/ERP biosignatures could provide functional biomarkers based on neural dysfunctions, which are the underpinnings of cognitive symptoms. These methods could assist with tracking trajectory of cognitive decline for individuals.

Hawaii neurologists & researchers are honored to contribute to this ground breaking research to develop a noninvasive, widely available and cost effective tool for Alzheimer's Disease diagnosis to serve our island and rural populations, " Kore Kai Liow, MD, Director, Hawaii Memory Disorders Center Principal Investigator, Alzheimer's Neural Network EEG (ANNE) Research Lab, Clinical Professor of Medicine (Neurology), Graduate Faculty, Clinical & Translational Research, University of Hawai`i John Burns School of Medicine. Dr. Liow trained in Cortical Neurophysiology at NINDS, NIH and continue to serve NIH on its Scientific Merit Review, Review Study Section. Questions: kliow@hawaii.edu