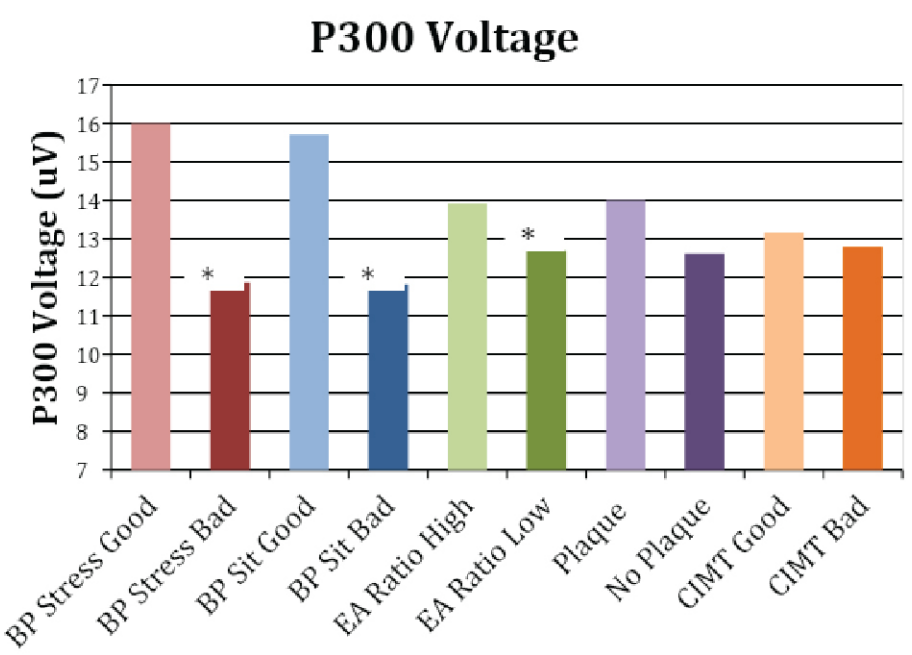
Your complete brain assessment tool

WAVi is commited to improving brain care outcomes through research. WAVi has collaborated with universities, healthcare practitioners, institutions and sports teams on a variety of research studies. These studies range from head injury and sports to validating interventions and investigating novel markers.

Wellness, Longevity and Brain Research

In-Clinic Measurements of Vascular Risk and Brain Activity

In this collaborative study with the The Boone Heart Institute, both brain and heart health metrics were shown to have a high correlation. Such association could help provide early warnings, manage risk factor and increase patient compliance.



The data for this study was collected from 2014 to 2017 and focused on a population of healthy patients whose routine preventative clinical examinations were retrospectively analyzed for links between their vascular risk (blood pressure, atherosclerosis, carotid intima-media thickness, and E/A ratio) and brain activity (electrophysiological event-related brain responses or ERP's).

Heart Rate Variability and Arterial Age

This ongoing one-year study looks at the feasibility of utilizing PPG measures of heart-rate variability to generate arterial age scores. WAVi PPG sensors transmit light through each earlobe and detect bloodflow change in the microvascular tissue, generating waveforms which are associated with the systole and diastole periods of bloodflow in the cardiac cylce.

CFS and Fibromyalgia Classification

WAVi is collaborating with our clinics to explore important biomarkers affected by chronic fatigue syndrome (CFS) and fibromyalgia. The data collected thus far suggests several markers to be statistically significant; physical reaction time, trail making A & B, F3/F4 alpha symmetry and frontal/occipital alpha peak magnitude. Clustering analysis on CFS/fibromyalgia compared to a reference group found classification specificity of around 80%.

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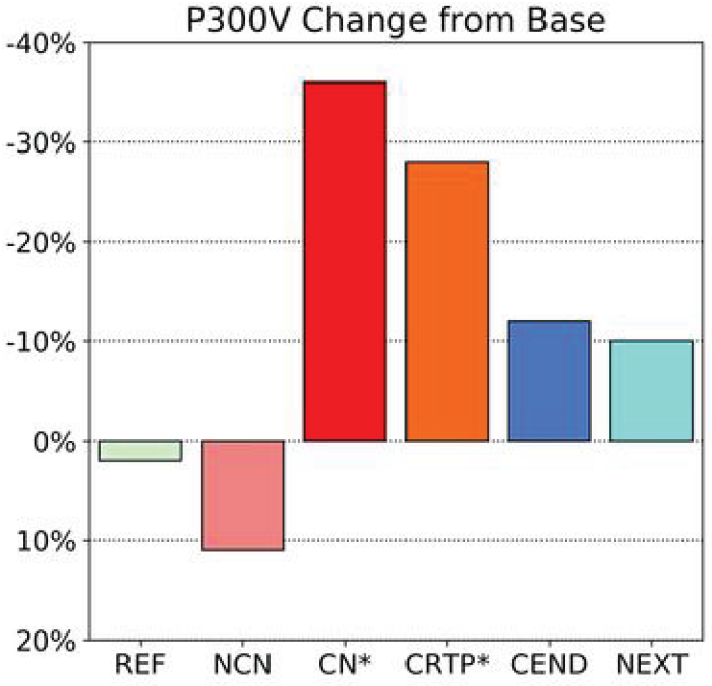
Anesthesia Delirium and P300 Voltage

WAVi is collaborating with Virginia commonwealth to investigate possible post anesthesia delirium and corresponding markers of brain function. Scans on subjects were collected before anesthesia and 24 to 48 hours after their surgical intervention. Initial results suggest P300 magnitude to be lower in followup scans of patients reporting delirium although more data is needed.

Concussion Research

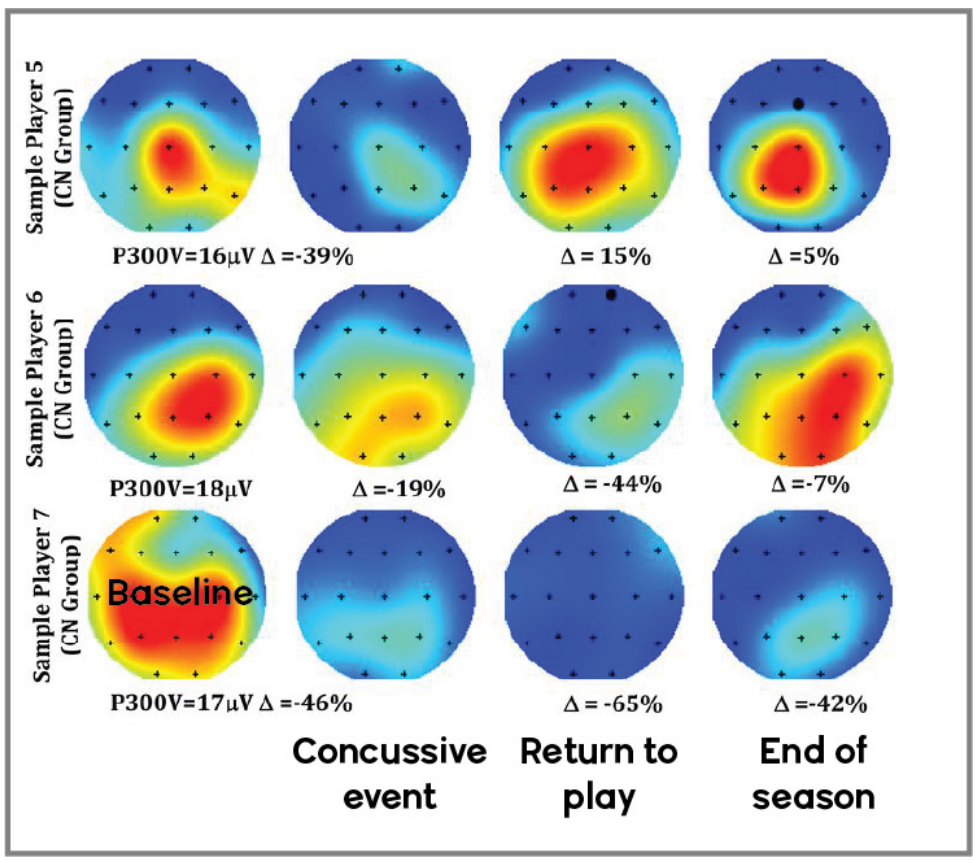
Event related potentials (ERP's) after sports concussion; a 4 year study

This published study tracked a mixed group of Division 1 athletes pre-season, after a concussive event and at the end of the season. The study showed that concussed players experienced significant reaction time and/or P300 amplitude changes compared to pre-concussion baseline measurements. This data suggests significant P300 amplitude changes after concussion that are quantifiable and consistent. P300 measurements from this study showed that 38% of athletes who suffered a concussive event were cleared too early by standard return to play protocols.



Electrophysiological trajectories of concussion; prolonged concussion

This collaborative study with the SPARCC clinic in Tucson, AZ looked at differences in measures of EEG coherence, EEG peak frequency, and amplitude of the P300 ERP between several patient groups.



It was observed that the acute, return-to-play, and prolonged concussion groups experienced a significant deficit in P300 amplitude. Significant increases in coherence were also seen in the return-to-play and the prolonged concussion groups. Changes for the prolonged concussion group are seen also in the frontal and in the occipital-parietal alpha amplitude.

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These results suggest that the significant changes in P300 amplitude after concussion may persist in more prolonged stages. Those suffering from prolonged concussion symptoms also tend to demonstrate an increase in connectivity and frontal alpha amplitude.

Concussion management: US Olympic Team and the Happy Healthy Brain Foundation

The study includes baseline scans of professional athletes when healthy, after a possible concussion and when the athlete is cleared to return. This study is a collaboration with the primary neurologist of the US Olympic team, Jeffrey Kutcher, MD, FAAN.

The primary metrics to be looked at in this study are auditory evoked response markers of brain speed (P300T) and brain voltage (P300V) with the objective of assessing the use of these metrics for concussion management.

Happy Healthy Brain founder and US Olympic athlete, Jake Pates
Photo: Cole Pates

Other WAVi concussion research collaborations include:

-Looking into the affects of near infrared light therapy (NIR) on youths with concussion histories. This study will look at brain speed and voltage along with standard assessments to assess the effectiveness of NIR treatments.

-Assessing datasets of traumatic brain injuries incurred during motor vehicle accidents. This study is correlating EEG data with MRI and eye tracking results in order to form a more complete understanding of how trauma affects the brain.

-WAVi is working in collaboration with Wayne State University to research youth boxing with a specific focus on the effect of sub-acute impacts on brain performance.

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Addiction and Rehabilitation Research

Addiction and cognitive resources

Current intake into rehabilitation programs do not typically include objective cognitive tests. This NIH grant Phase I is working towards developing a new multimodal measure for detecting cognitive changes associated with substance abuse rehabilitation. Assessing the effectiveness of substance abuse rehabilitation is a pressing clinical problem especially when relapse rates are high. In this case, the ability to identify cognitive changes should improve outcomes.

Chronic Pain Research

This NIH funded study explores cognitive markers of acute and chronic pain. One of the objectives of this research is to structure a dataset that explores both acute-chronic pain transitions and interventional outcomes. Both fMRI and EEG techniques are used to ensure a robust and cross-validated dataset.

For this study WAVi devloped a novel test for assessing chronic musculoskeletal pain that is readily accessible to clinicians as well as a unique and dynamic data structure. Among the potential implications of this data structure are: to use AI to help longitudinally predict the transition to chronic pain; the ability to test the effectiveness of chronic pain interventions and ensuring treatment resources are allocated properly.

Collaborate with WAVi to create datasets that will improve outcomes and refine protocols

WAVi v.1.2