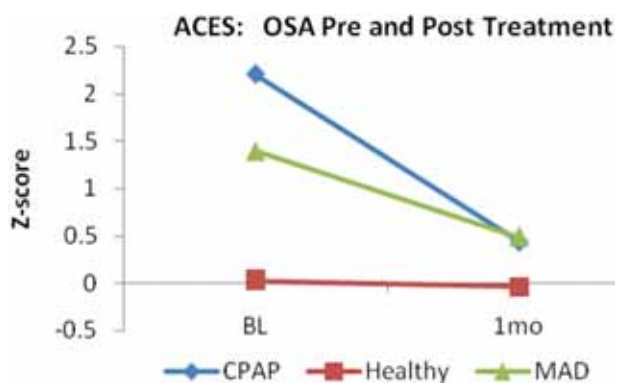


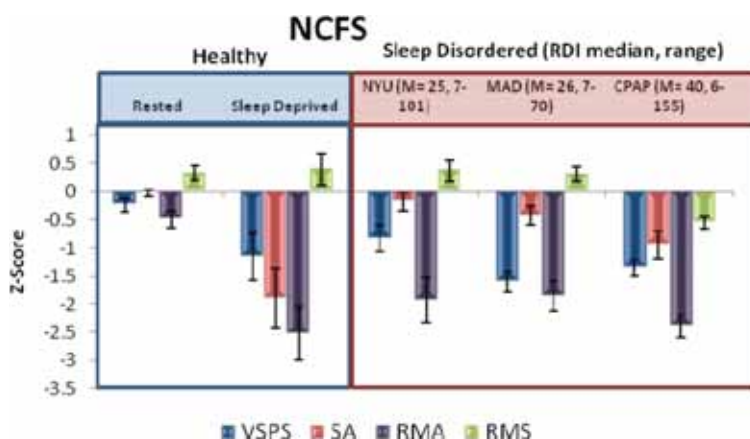
Objective Quantification of Daytime Drowsiness and Disease

The Alertness and Memory Profiler (AMP) provides assessment of physiological and neurocognitive factors using a non-invasive integrated and synchronized test battery (3-Choice Vigilance Test, Image Recognition (IR), IR with Interference, Verbal/Number-Image Paired Associate Learning, and Sternberg Verbal Memory Scan). This approach facilitates rapid data collection from any size population, enabling large scale epidemiological studies, disease diagnosis or treatment outcome evaluations. The AMP is sufficiently rugged and robust for studies to be conducted in operational environments (e.g., in the desert at 29 Palms) and its metrics have been proven useful in predicting susceptibility to sleep deprivation or marksmanship skill acquisition in US Marines.



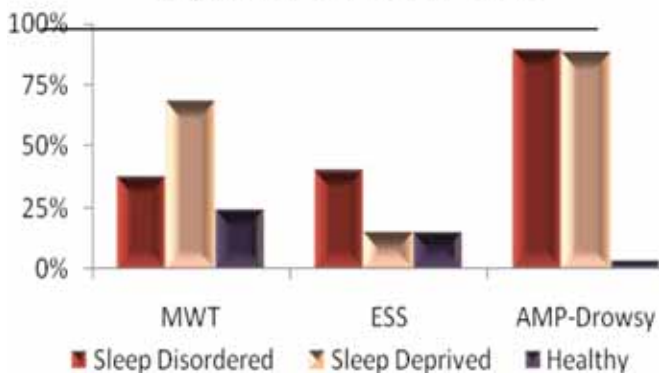
One of the AMP metrics called the ACES score can be derived with less than one-hour of testing. It uses EEG and performance measures to discriminate healthy controls from obstructive sleep apnea (OSA) patients prior to treatment, providing a sensitivity of 0.88 and a specificity of 0.96 (n=396). Eighty-three percent of OSA patients had an ACES score of 7 or greater and 95% of the healthy subjects had a score of 4 or less. The graph to the left shows the change in ACES in OSA patients pre- and post-CPAP or Mandibular Advancement Device (MAD), and repeated testing in healthy subjects.

A 2-hour AMP test battery allows neurocognitive factors scores (NCFS) to be calculated for visual-spatial processing speed (VSPPS), sustained attention (SA), recognition memory accuracy (RMA) and recognition memory speed (RMS). The graph to the right compares NCFS across Rested and Sleep Deprived Healthy subjects, OSA patients from MAD and CPAP studies and a third group of patients who underwent full polysomnography followed by Maintenance of Wakefulness Test (MWT) at the New York University School of Medicine.



The AMP Drowsy Detector combination of EEG, EKG, and performance indices from a four-task, one-hour battery to provide a highly sensitive and specific classifier to accurately discriminate daytime drowsiness due to sleep deprivation or sleep disorders. The graph to the left compares the AMP to the MWT and Epworth Sleepiness Score. The AMP is 20% more specific than the MWT in identifying fully rested healthy subjects, 20% more sensitive in identifying sleep deprived healthy subjects and 51% more sensitive in identifying patients sleep deprived as a result of sleep disordered breathing. These data show the ESS is insensitive as a measure to identify sleep deprivation.

Classification of EDS



Berka C., A. I., Burschtin O. et al. (2009). "High Throughput Brain-Behavior Assay: Quantification of EEG and Performance in Patients Referred for Assessment of Daytime Drowsiness." *Sleep* 32: A383.

Kintz, N., Johnson, R., et al. (2009). "Mandibular Advancement Devices Significantly Improve Neurocognitive Function for Patients with Obstructive Sleep Apnea." *Sleep* 32: A229