Title

Cerebrovascular Responses in OSA Patients during CPAP Therapy Measured in the Frontal Lobes of the Brain Bilaterally, Simultaneously, and Non-Invasively Using Frequency-Domain Near-Infrared Spectroscopy.

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OSA is associated with severe cardio/cerebrovascular morbidity. Our goal is the development and introduction of Frequency−Domain Near−Infrared Spectroscopy (FD−NIRS) in Clinical Diagnostics and Sleep Medicine to identify patients at risk. FD−NIRS allows non−invasive, continuous, lengthy, and real−time measurements of cerebral tissue oxygenation and hemodynamics by measuring absolute hemoglobin (oxygenated, deoxygenated, and total) concentrations. We performed FD−NIRS concomitantly to conventional polysomnography in 135 subjects. Cerebrovascular autoregulatory responses were evaluated with an Absolute NIRS Brain Oximeter (OxiplexTS, ISS, Champaign, IL) in the frontal lobes bilaterally. After rigorous NIRS screening criteria, 40 controls and 40 OSA patients were considered. The reported findings are from a specific Severe OSA Cohort (N=5 OSA, age range 49−55, 4 males/1 female, AHI 55−90) within the total OSA group, where the subjects serve as their own controls. We are reporting quantitative measurements of cerebral tissue hemodynamic variables during the initial 3−6 hours of diagnostic PSG and subsequently, during 3−6 hours of CPAP titration. Our results (4 NIRS variables/hemisphere/second/3−6hrs/subject) suggest that there is a wide spectrum of inter− and intra−hemispheric hemodynamic responses which are unique to each OSA patient before and after CPAP and non−uniform within the total OSA cohort. Our future work will focus on a larger sample and evaluation of mechanisms that may explain the variability in cerebral tissue hemodynamics after restoration of ordered breathing and peripheral hypoxemia achieved by CPAP therapy. This abstract is funded by: NIH/NINDS R44NS040597.