two unfamiliar names. These names were spoken by either a familiar voice to the subject (FV) or an unfamiliar one (UFV). We used an automatic algorithm to detect K-complexes, and performed event-related, time-frequency, and phase coherence analyses to unravel the ongoing brain processes during the auditory-evoked K-complex. Finally, we utilized a machine learning approach to differentiate between brain responses to different stimuli during NREM sleep.

Results: We show that UFVs evoked more K-complexes than FVs; however, there was no difference in the number of evoked K-complexes between the names. The difference in the number of evoked K-complexes between FVs and UFVs appeared as early as 100ms post-stimulus and disappeared right after the stimulus presentation ends (mean stimulus duration 808ms). Moreover, by contrasting FV and UFV stimuli that evoked K-complexes, we observed that UFVs evoked a larger amplitude of the N550 component of the K-complex. Further analysis revealed that this difference in the amplitude of the N550 does not demonstrate larger amplitudes of the UFV-evoked K-complexes but rather stronger phase synchronization of brain responses to the onset of UFVs as shown by inter-trial phase coherence analysis. Spectral analysis revealed in the presence of the evoked K-complex, UFVs evoked stronger arousal-like response (>16Hz) relative to FVs. Finally, by training a linear discriminant analysis (LDA) classifier to decode between FV and UFV stimuli from post-stimulus brain activity, we show that only in the presence of evoked K-complexes, the classifier was able to decode the presented voice.

Conclusions: Our results suggest the presence of time windows in NREM sleep during which the brain continues to respond preferentially to relevant sensory information. Central to such responses is the K-complex which, when evoked by sensory stimuli, reflects underlying brain processes that serve to extract and process relevant information. We propose that such dynamic reactivity to the environment entails the presence of a sentinel-processing mode where the brain remains connected to the environment while engaging in the vital processes that are ongoing during sleep.

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LAPSES OF REACTION TIMES DURING COGNITIVE AND PSYCHOMOTOR TESTING ARE THE MOST DELICATE INDICATOR OF POOR SLEEP ASSESSED WITH PITTSBURGH SLEEP QUALITY INDEX IN MEDICAL STUDENTS

I. Pavlinac Dodig [1], Z. Dogas [1], V. Dogas [2]. [1] *University of Split School of Medicine, Neuroscience, Split, Croatia;* [2] *University of Split School of Medicine, PSYCHOLOGICAL MEDICINE, Split, Croatia*

Introduction: Numerous studies supported the idea that sleep has important roles in regulation of cognitive and affective brain functions. Even though the overall sleep quality contributes to cognitive performance, distinction of various components of subjective sleep quality might provide more precise insight into the aforementioned association, specifically in the student population. The aim of this study was to elucidate the relationship between components of sleep quality and reaction times on simple and complex cognitive and psychomotor tests in medical students. We hypothesized that sleep quality components are more precise indicators of sleep than overall subjective sleep quality and that poor sleep can be detected even by subtle deteriorations in cognitive performance.

Subjects and Methods: A total of 164 students (49 men) enrolled in the Basic neuroscience course at the University of Split School of Medicine, participated in the study. All subjects completed Pittsburgh Sleep Quality Index (PSQI), a self-reported general measure of sleep quality and disturbances over the past one-month period. From the 19 items of the PSQI questionnaire, 7 components are created indicating subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Cognitive and psychomotor abilities were assessed using Complex Reactionmeter Drenovac (CRD-series), a battery of computer-based psychomotor tests, measuring reaction times and speed of information processing. Three CRD-series test were used: CRD11, assessing solving simple arithmetic operations, CRD311, assessing discrimination of the light signal position, and CRD411, assessing complex psychomotor coordination of upper and lower limbs. In each test, several variables were analyzed: total test solving time (TTST), minimum single task solving time (MinT), maximum single task solving time (MaxT) and start to end ballast ratio (SB/EB).

Results: There was no significant correlation between TTST and MinT with the total PSQI score on CRD11 (P=0.633 and P=0.881), CRD311 (P=0.446 and P=0.951) and CRD411 tests (P=0.464 and P=0.412). However, SB/EB ratio was correlated with total PSQI score on the CRD311 test (r=0.201, P=0.01). Regression analysis using 7 components of the PSQI questionnaire as predictors revealed that there was an association between use of sleeping medication and MaxT on CRD11 test (β=0.167, P=0.037). On CRD311 test, prolonged MaxT was associated with increased sleep latency (β=0.379, P<0.001), prolonged sleep duration (β=-0.439, P<0.001), decreased habitual sleep efficiency (β=0.404, P<0.001), and less frequent sleep disturbances (β=-0.370, P<0.001). On the CRD411 test, prolonged MaxT was associated with shorter sleep duration (β=0.174, P=0.03) and less frequent reports on daytime dysfunctions (β=-0.165, P=0.039).

Conclusions: Our results suggest that precise analysis of sleep quality components might provide a better insight into sleep of students in comparison to overall subjective sleep quality. Maximum single task solving time, as a measure of cognitive performance on the tests of simple arithmetic operations, discrimination of the light signal position, and complex psychomotor coordination was associated with the sleep quality components. Thus, one might presume that this measure, possibly indicating lapses of concentration, is the most sensitive to discriminate impairments of sleep quality components.

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MINIMALLY INVASIVE NASAL AIRWAY SURGERY CAN REVERSE ADHD IN CHILDREN

P. Catalano [1], J. Walker [2], D. El Mardeeni [1], M. Schlewet [1]. [1] *Tufts University School of Medicine, Otolaryngology, Boston, United States;* [2] *Boston University School of Dentistry, Orthodontics, Boston, United States*

Introduction: Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD) are increasingly diagnosed in children, and estimated to occur in nearly 10% of children in the US. While their etiology can be varied and complex, ADD and ADHD are known to occur in up to 50% of children who exhibit sleep disordeeed breathing (SDB). The mechanism of hyperactivity in these children is directly related to 2 phenomena of SDB: (a) the secretion of adrenaline during sleep to assist children to breath through their airway obstruction, and (b) the build up of "toxins" in the brain during the day that are not appropriately cleared during interrupted sleep. Sleep patterns in children with SBD are characterized by intermittent airway obstruction resulting in episodic hypoxia, sleep fragmentation due to repeated arousal, mouth breathing, and sleep deprivation. In the past decade, medical and behavioral treatment of ADHD has been extensively studied, however no one has yet evaluated the effect on ADD/ADHD behavior after correcting SDB in these children. In our study, we compare the changes ADHD behavior before and after targeted upper airway surgical treatment for SDB in children.

Materials and Methods: A prospective pilot study designed to evaluate the effect of targeted nasal surgery on improving ADHD symptoms in children with SDB. 72 children with ADHD symptoms who demonstrated SDB as determined by history, physical exam, and sinus CT-scan were included. The validated Barkley Deficits in Executive Functioning Scale was obtained at baseline and 6 months after surgery. Data from this ADHD evaluation tool was analyzed and compared for each patient using the reliable change index scale (RCI). Parents completed the assessment tool during the child's clinic visits.

Results: 72 patients aged 6-17 years (M 91%; F 9%) completed the study. For ages 6-11 years, 44% of children showed "highly significant" improvement in their RCI, and another 20% improved between 75-99% of the "highly significant" threshold. For children ages 12-17 years, these numbers were 17% and 67%, respectively. 5% of children in both age groups showed slightly worse RCI scores after surgery. Combined, 37.7% of children exceded the RCI threshold for "highly significant change", and another 26% improved to between 75-99% of the "highly significant" threshold. There were no surgical complications in this study cohort.