

APPENDIX IV

**ABSTRACT OF PRESENTATION**

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**CORRELATIONS BETWEEN EEG INDICES OF ALERTNESS, MEASURES OF PERFORMANCE AND SELF-REPORTED STATES WHILE OPERATING A DRIVING SIMULATOR**

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Four males and four females operated a 50-min challenging and a 55-min monotonous driving simulator (DS) scenario with randomly presented divided attention tasks (DAT) while fully rested on Days 1 and 2 and partially sleep-deprived on Day 3. Subjective visual analog scales (SS) rating attention, cognition, concentration, sleepiness and stress were administered before and after each DS scenario. One-second epochs of EEG recorded from CzPz and CzOz were classified into high vigilance (HV), low vigilance (LV), EEG associated with eyes closed condition (EC) or sleepy (S) using a multi-level, discriminant function analysis (DFA). Correlations were computed between the DFA classes, DS performance measures and SS responses.

HV was positively correlated with high levels of self-reported attention, cognition, and concentration, and low levels of sleepiness and stress. LV was negatively correlated with high levels of attention, cognition, and concentration, and positively correlated with sleepiness and stress. Epochs classified as EC showed the greatest correlation with driving performance, demonstrated by the positive correlation with accidents ( $r = 0.44$ ), collisions ( $r = 0.17$ ), traffic tickets ( $r = 0.26$ ), and incorrect DAT responses ( $r = 0.70$ ) and negative correlation with correct DAT responses ( $r = -0.54$ ). HV was also negatively correlated with traffic tickets ( $r = -0.19$ ). While attention and number of traffic tickets were negatively correlated ( $r = -0.22$ ), stress and number of collisions ( $r = 0.23$ ) and speeding tickets ( $r = 0.32$ ) were positively correlated. These results demonstrate that EEG acquired while driving can be used to assess levels of alertness, which correspond with performance and self-reported states. Funded by NIH, NINDS grant R44NS 35387 and contract N44NS92367.

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