0414
SLEEP DEPRIVATION IN THE PIGEON USING THE CONVEYOR-OVER-WATER METHOD

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Introduction : We previously performed prolonged sleep deprivation in pigeons using the disk-over-water method (DOW), which we found less effective in pigeons than in rats. We have developed a new apparatus, termed the conveyor-over-water (COW) to produce more effective sleep deprivation in the pigeon.

Methods : The COW operates similarly to the original DOW, with one deprived bird and its yoked control receiving the same stimulation. Fifteen birds were instrumented for recording EEG and EMG. Weight, food, water consumption and subcutaneous temperature were recorded daily. Birds were totally sleep deprived for seven days, allowed to recover for seven days, then deprived for up to 21 days and again allowed to recover.

Results : Total sleep time on the first day of deprivation was reduced to an average of 12% of baseline amounts; this was a greater amount of deprivation than achieved using the DOW with pigeons (average of 38% of baseline). REM sleep was almost completely eliminated. Recovery sleep showed increases in REM sleep exceeding 200% of baseline. Energy expenditure and temperature showed trends to increase and decrease, respectively, and to a greater extent in deprived birds compared to controls.

Conclusion : The COW is much more effective than the DOW in achieving total sleep deprivation in the pigeon. Pigeons show a pattern of physiological changes similar to those seen in rats, but with less separation between Deprived and Control animals. This may be due to pigeons' ability to change behavioral state quickly; they fall asleep almost instantly when the belt stops. Thus, stimulation rates are high, increasing the control birds' level of deprivation. Our data suggest that birds may be less vulnerable to sleep deprivation and/or the methods used to achieve it in comparison to rats. Alternatively, due to their rapid behavioral state transitions, birds may be better able to acquire enough sleep to avoid the deprivation syndrome seen in rats.

0415
CALORIC INTAKE DURING SLEEP DEPRIVATION WITH OR WITHOUT CIRCADIAN MISALIGNMENT

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Introduction : Sleep loss has been associated with increased appetite. Epidemiological studies have shown that shift workers, who are chronically sleep deprived, have an increased risk of developing obesity. It is not known whether circadian misalignment (sleeping during the daytime) impacts food intake independently of sleep loss.

Methods : 18 healthy males (age 24±1 y, BMI 23.1±0.5 kg/m2) participated in one of two protocols: extended wakefulness (EW) or extended wakefulness with displaced sleep (EWD). Following 3 baseline nights with 10-h bedtimes, the subjects had 8 days with 5-h bedtimes, either from 0030 to 0530 every night (EW protocol), or with daytime sleep (0900-1400) on the 2nd, 3rd, 5th and 6th nights (EWD protocol). The recovery period (two 12h nights and one 10h night) were identical for both protocols. Food was given as meals (breakfast, lunch and dinner) and the subjects also had free access to various snack items. In the EWD protocol, a midnight meal was served when sleep was displaced.

Results : Total sleep time over the 8 days of sleep restriction was similar in both protocols. Daily energy intake was 26%±6% higher during sleep deprivation than during recovery for both protocols (p<0.05). Energy intake during breakfast and lunch was the same for both protocols whereas dinner intake was higher in EW subjects (p<0.05). Energy derived from snacks was higher in EWD subjects (p<0.05), especially during days of daytime sleep. The snacks had higher carbohydrate and lower protein content than the meals (p<0.05).

Conclusion : Recurrent partial sleep deprivation resulted in increased total energy intake, with no additional effect of circadian misalignment. However, circadian misalignment was associated with a higher proportion of energy intake from snacks relative to meals. Because snacks are usually of poorer nutritional value, circadian misalignment may aggravate the consequences of the increased appetite due to sleep deprivation.

0416
VARIABLES PREDICTING SLEEPING AT THE WHEEL AMONG LONG-HAUL TRUCKERS

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Introduction : Long-haul truckers who fall asleep at the wheel pose a threat to themselves and others who share the highways with them. Motor vehicle crashes are the cause of most occupational deaths among truck drivers. An expected 20% job growth in the U.S. trucking industry between the years 2000-2010 makes this an especially timely issue in occupational safety and health. Predictor variable identification may lead to the design and implementation of meaningful sleep-related motor vehicle crash prevention strategies.

Methods : Data were collected in this cross-sectional study from a convenience sample of long-haul truckers (N = 843) at truck shows across the U.S. and truck stops in Kentucky. Binary logistic regression analysis using backward stepwise likelihood ratio methods was used to determine whether the initial eight independent variables predicted the probability of falling asleep at the wheel at either 30 days or 12 months.

Results : Statistically significant predictive models were derived for falling asleep at the wheel within 30 days (chi square = 35.32, p < .001) and 12 months (chi square = 43.08, p < .001). Five predictor variables were retained in the final models: Epworth Sleepiness Scale score > 10; driving more than six hours at night; sleeping less than six hours per night and the use of medication to stay awake. Overall rates of correct classification for the final models were 94.6% for sleeping at the wheel within 30 days and 91.3% for sleeping at the wheel within 12 months. Hosmer and Lemeshow Goodness-of-Fit testing indicated a good fit of the models to the data.

Conclusion : Findings from this study indicate focus areas for assessment of sleep-related motor vehicle crash risk. Focal points for sleep hygiene education; work redesign strategies and policy changes may be drawn from the study.

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