

Oral Presentation Circadian Rhythms: Shift Work

205.E

CIRCADIAN ADAPTATION TO NIGHT SHIFT WORK: DAYTIME DARK IS GOOD, ADDING LIGHT DURING THE NIGHT SHIFT IS BETTER

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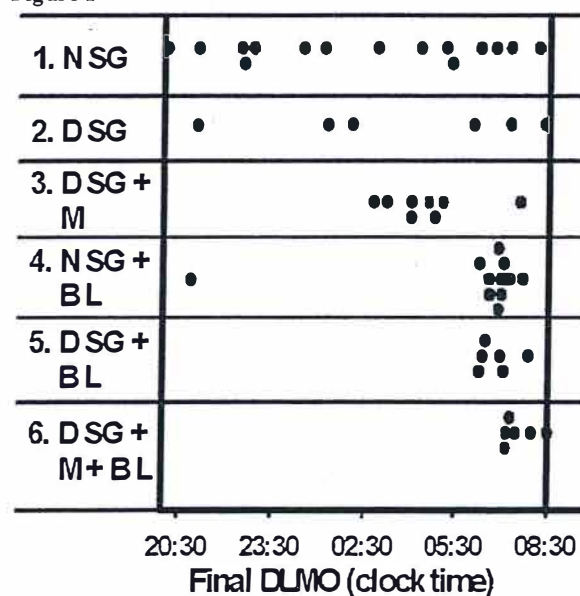
Introduction: Various interventions have been tested to help phase shift the circadian clock and promote adjustment to night work and day sleep schedules (1). Our ongoing study tests various combinations of interventions.

Methods: Thus far, 52 healthy young adults have participated. The subjects work 5 consecutive simulated night shifts (23:00 to 07:00) and sleep at home (08:30 to 15:30). Subjects are required to stay in bed, in the dark for the full 7 hours. This daily dark sleep episode is the building block for all combinations of interventions, and others are added in order of the least amount of effort for the night worker. There are 6 intervention groups (see Figure). While traveling home, subjects wear normal sunglasses (N SG) or dark sunglasses (D SG) (transmit 15% or 2% of light respectively). Subjects take a placebo or melatonin (M) pill (1.8 mg sustained release) before daytime sleep. During the night shifts, subjects are exposed to a moving pattern of intermittent bright light (BL) (~5000 lux, 20 min of some hours) or dim light (~200 lux). There is a circadian phase assessment before the first and after the last night shift in which subjects give saliva samples every half hour for determination of the dim light melatonin onset (DLMO). Sub-

jects fill out sleep logs. They also complete computerized mood and performance batteries during the night shifts.

Results: The Figure shows the final DLMO in all subjects. The more interventions that were added, the more likely the final DLMO was phase delayed enough to have been in a normal phase relationship with the preceding daytime sleep episodes (2-3 hours before 8:30am). The groups that received BL shifted the most. Other studies have shown that the temperature minimum occurs about 7 hours after the DLMO. Thus, we estimate that subjects whose DLMO occurred after 1:30am had temperature minima that fell within daytime sleep. This amount of re-alignment should reduce symptoms of night shift work. Subjects who shifted their final DLMO past 1:30am felt significantly more alert (Stanford Sleepiness Scale) and showed significantly less decrement in performance (lapses on a psychomotor vigilance task) during the night shifts than those who did not. However, there was no difference among groups in daytime sleep duration. Subjects reported sleeping for almost the full 7 hours.

Figure 1



Conclusions: These data suggest that a regular dark daytime sleep opportunity and normal sunglasses are enough to produce circadian adaptation in some subjects, but more interventions are needed in others. Bright light during the night shift increases the likelihood of circadian adaptation. We need to run more subjects to determine whether melatonin produces an additional advantage.

References:

(1) Burgess HJ, Sharkey KM, Eastman CI. Bright light, dark and melatonin can promote circadian adaptation in night shift workers. *Sleep Medicine Reviews* (in press).

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