

# Newsletter

June 2004

## **If you Feel Fine on Six Hours of Sleep, You're Kidding Yourself**

Sport Medicine digest, October 2003, Volume 25, Number 10

A sleep-deprived clinician recently sent an email to a friend. He was responding to comments about an article he had written only three months earlier. "When did I do that one?" the clinician wrote. "What day is it? Where am I?" The clinician had toiled in medicine for decades, but he was only half-kidding. After weeks on a grueling rotation, he felt the way virtually every reader of this newsletter has felt: Things weren't clicking: the twilight zone between the ears was cotton-ball soft.

Though medicine's contribution to sleep deprivation may be rivaled only by that of the military's, well-controlled research on sleep deprivation and cognitive performance is appallingly rare. How do the body and mind perform after week upon week of sleep-stunted nights? How do they perform without any sleep at all? Amazingly, there is a lot of disagreement.

A recent study brings new rigor to answering these questions. It suggests that if you regularly sleep six hours or less per night, you are paying dearly for it (and, perhaps, your patients are too). And, like your lay counterparts driving trucks and moonlighting in doughnut shops, you are probably too impaired to know it.

Hans P.A. Van Dongen, PhD, et al. from the University of Pennsylvania randomized 48 healthy adults to one of three sleep doses (four, six, or eight hours per night) for 14 consecutive days or to total sleep deprivation (three nights without sleep). Prior to the study, the subjects normally slept 7.6 to 7.9 hours per night. (See Van Dongen et al., 2003).

Unlike past studies, which found few detrimental effects of sleep deprivation, this study was conducted in a laboratory. Sleeping periods, waking activities, and diet were carefully controlled. The researcher performed neurobehavioral assessments every two hours of wakefulness. They measured reaction times to a random stimulus ("psychomotor vigilance"), time required to match numbers to geometric shapes, time to complete 50 arithmetic problems and sleepiness. They also measured subjects' "sleep architecture" using polysomnography tests.

The result: "Sleep periods chronically limited to four hours and six hours per night progressively eroded the effectiveness of psychomotor vigilance performance, working-memory performance and cognitive performance," according to Van Dongen et al. The more days the sleep deprivation lasted, the worse subjects performed.

Those who slept four hours per night for two weeks had cognitive impairments equal to those who went two days without any sleep. Subjects who slept six hours per night for two weeks reached levels of impairment equivalent to those who went one night without any sleep.

This research challenges a few longstanding beliefs in the scientific and lay communities. It suggests, for starters, that people do not adjust to sleep deprivation-even if they feel otherwise. "Surprisingly, by the end of the 14 days of sleep restriction when performance was at its worst levels, subjects in the four-hour and six-hour sleep period conditions reported feeling only slightly sleepy," note Van Dongen et al.

The study also undermines the "core sleep" hypothesis - which posits that humans need only six hours of sleep to repair "wear and tear" on the cerebrum and preserve satisfactory daytime functioning and that any sleep beyond six hours serves mostly to while away the tedium of darkness.

Finally, the study also dispels the myth (already dismissed by many a surgical and medical resident) that youth is protective against these cognitive deficits. The participants in this trial were healthy adults 21 to 38 years of age.

What's the ideal amount of sleep? Eight hours. "Cumulative wakefulness beyond 15.84 hours predicted performance lapses across all experimental conditions," the researchers note.

An important caveat should be added to these conclusions. The subjects in this study were deprived of exercise, stimulants (Caffeine, etc.) and naps during the entire period of the study. The authors did not explore the extent to which these might attenuate cognitive deficits caused by chronic sleep deprivation.

#### Reference

*Van Dongen HPA et al. The cumulative cost of additional wakefulness: Dose response effects on the neurobehavioral functions and sleep physiology from chronic sleep restrictions and total sleep deprivation, Sleep, 2003: 26(2): 117-26.*