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## Book Review: The Promise of Sleep

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## BOOK REVIEW

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THE PROMISE OF SLEEP. W. C. Dement. New York: Dell, 1999.

More than a decade ago it was my privilege to attend a workshop on sleep with the father of sleep medicine, William Dement, MD, PhD. He started the first sleep lab in the world at Stanford University in 1970. He was an exceptionally fine teacher who held his audience spellbound. After listening to him, I began routinely asking my patients questions about sleep, which have proven invaluable ever since. Therefore, it was wonderful to learn that he had authored a book—and one, which at only \$15 for 556 large paperback pages, is a true bargain.

*The Promise of Sleep* contains a wealth of fascinating information, communicated in the same kind of appealing style that Dr. Dement brings to his lectures. The book was written for the general public and the professional. The public will likely find his book a little more detailed than they would like at times, and professionals will be mildly frustrated that he has not provided references for the interesting studies that he frequently describes, and tells a few too many stories. Nonetheless, overall it is a book that will be both enjoyed by my colleagues, and one that we can give to our patients for bibliotherapy.

The definitional information about sleep in the first chapter will be “old hat” for most of our readers. The second chapter is an informal personal history of Dr. Dement’s journey into sleep research, which has human interest even though it may not teach you much that is new. However, the meat of the book begins in chapter 3, “Sleep Debt and the Mortgaged Mind.” Here you will begin learning chilling and fascinating facts. For example, did you know that the real culprit in the Chernobyl nuclear disaster or in the *Exxon Valdez* oil spill was not alcohol, but sleep deprivation? You will learn that someone who has had six

hours of sleep all week is irresponsible behind the wheel of a car because he or she has reaction times equivalent to those of a drunk driver. Chapter 9, "Our Chronically Fatigued Syndrome," should probably logically follow chapter 2. One of the most fascinating chapters of the book, it reviews studies of the detrimental effects of sleep deprivation. Were you aware that 33% of traffic accidents are related to sleepiness? Fatigue is the number-one cause of fatal crashes in young drivers and 70% of truck drivers have been found to have sleep apnea—13% with severe sleep apnea.

We are always taught that we are probably much more likely to have an accident on the way to the airport than we are on an airline flight. This is true. However, the next time you go on a nighttime, transoceanic flight, it may be disquieting for you to know that reaction times of these pilots are decreased by more than 25% and have been found to be similar to those of persons who have been up all night. While you are anticipating going to sleep as they fly across the ocean, you can know that your pilots are frequently falling into microsleeps, usually of 5-10 seconds duration, but with 15% of the episodes lasting over 15 seconds. Pilots have been found to be falling asleep even during the landing phase of the flight. In fact, on these flights, crews had a combined total of 120 microsleeps during the descent and landing phases of flights, and 22 in the last 30 minutes. Comforting, isn't it? Physicians, particularly medical residents, are often no better than pilots or long haul truck drivers. In an anonymous survey, 42% of house staff in a San Francisco hospital admitted that they killed at least one patient through a mistake related to their fatigue!

As neurotherapists, we should heed Dr. Dement's statement that, "Sleep deprivation is the most common brain impairment" (p. 231). As he likes to say, sleep deprivation makes you stupid! Research has shown that if someone sleeps only four hours a night for two weeks, his or her performance is equivalent to someone who has been kept up for three straight days and nights without sleep. After 24 hours awake, our coordination deficits are equivalent to drunk drivers with a blood alcohol level of .1%.

Chapter 3 introduces you to the Multiple Sleep Latency Test for assessing sleep deprivation. Dement refers to sleep debt as "nature's loan shark," and notes that, "The brain keeps an exact accounting of how much sleep is owed" (p. 60). Sleep debt—how much less than eight hours sleep adults have each night—accumulates and affects everything from research measures, to attention, IQ, and drug effects. The debt is not erased by simply getting eight hours sleep on subsequent nights. The

debt remains until we get more than eight hours sleep and begin paying it off. Have you ever seen patients come into a neurofeedback session and inexplicably display significantly more slow activity than they usually produce? I have learned that my first question in this situation is, “How much sleep did you have the last couple of nights?”

Sleep debt is a pervasive problem. Seventy-five percent of adults admit to experiencing daytime sleepiness. But, even among those individuals who claim that they are not sleepy during the day, only one in 10 is found to be at peak alertness—an important fact when so many of us do attentional training. And, when alcohol is paired with sleep deprivation, the results can be devastating. I remember learning from Dr. Dement, for example, that if a college student has been studying for midterm exams all week, getting five hours sleep a night, and then they drink three beers, it will produce the physiological sedation that a six pack would ordinarily produce.

Chapter 4 discusses circadian rhythms and the role of light and melatonin. Individuals who work with peak performance and athletics will find the discussions of “resetting the biological clock” with astronauts to have direct application. In relation to this topic, in chapter 9, Dement discusses the influence of circadian rhythms and the “home-field advantage” in athletics.

Sleep patterns across the life cycle and with aging are the focus of chapter 5. The problem of sleep deprivation in teenagers receives particular emphasis, with its influence on automobile accidents, aggressiveness, and impaired ability to learn. Very early morning classes in high school are considered to be a bad time for learning. While many people would assume that teenagers need less sleep than younger children, Dement believes that the physiological need for teenagers through college ages is more than nine hours sleep per night. Across the life cycle as we enter the “golden years” of retirement, more than 40% are found to have a form of sleep apnea. As if that is not enough to look forward to, among elderly nursing home patients, sleep studies have found that there is not an hour of the day during which they are not both asleep and awake. The elderly are awake more often, and nod off more often.

Chapter 6 focuses on problems of insomnia. Causes of insomnia that are discussed include problems in the sleep environment, hyperarousal, restless legs syndrome, gastroesophageal reflux, and fibromyalgia. Onset insomnia problems are often circadian rhythm problems, and Dement discusses aids for this such as being exposed to bright sunlight in the morning. His review of treatment for insomnia is overly brief, but includes mention of relaxation techniques, stimulus control, improving

sleep hygiene, cognitive therapy, sleep state restriction, biofeedback, alternative therapies, and melatonin. His two paragraphs on hypnosis demonstrate limited knowledge of that subject, however. It seems to this reviewer that an inordinate amount of space is focused on the use of medications to treat insomnia, which he fully supports.

The seventh chapter addresses snoring and sleep apnea. Sleep apnea causes the sufferer to get almost no continuous sleep during the night, with the result that they are prone to fall into dangerous microsleeps during the day. In addition, during apneas, it has been found that the heartbeat slows, sometimes almost disappearing, and occasionally actually stopping. In severe cases, breathing can stop 45-100 times an hour. He notes that in addition to being starved for oxygen, the heart is struggling with the autonomic problems associated with the struggle to breathe. Cardiac arrhythmia can develop, and there is tremendously elevated blood pressure that damages the heart, brain, kidneys, and other organs. It is very distressing to Dr. Dement that so few cardiologists and internists are aware of the contribution of apnea to cardiovascular disease. He states:

I am absolutely convinced that obstructive sleep apnea plays a major role in causing high blood pressure, heart disease, and stroke. This is a controversial issue, but for now I urge people who have high blood pressure, heart disease, or concern about a stroke to ask themselves two questions: Am I tired in the daytime? And have I been told that I snore? (p. 181)

Checking for sleep apnea should be mandatory if either question is answered affirmatively. He very practically suggests that an initial test can consist of putting a tape recorder next to the bed at night. He finds that when sleep apnea is at a severe level, chronic cardiovascular problems are always present. "Consider apnea a likely explanation if you [or your patient] are fatigued, substantially overweight, and accustomed to waking up with a sore throat and/or headache" (p. 349).

Continuous positive airway pressure (CPAP) machines are very helpful in treating apnea. However, he also notes a revolutionary procedure that has been pioneered at the Stanford Sleep Disorders Clinic. They are using radio-frequency energy, which in the past has been used to shrink the prostate, to shrink tissue in the upper airway. It is now FDA approved, involves only a local anesthetic, is bloodless, almost painless, and produces no wound or sutures.

Chapter 8 is devoted to a discussion of narcolepsy and REM behavior disorder. I was surprised to find that narcolepsy is relatively common, affecting one in 2000 people—half as common as breast cancer and five times more common than leukemia. The peak onset is during adolescence, but it may develop in young children or as late as the age of 50. Apparently it is treated very effectively with stimulants, although patients must remain on them their entire lives. In chapter 12 he notes a new drug for narcolepsy treatment, modafinil, which wakes people up without amphetamine-like effects. It is not a stimulant, but belongs to a new class called somnolytics. He suggests that this medication could have utility in emergencies for the military, surgeons during very long operations, and leaders during crises. Naturally, I could not help but wonder about the potentials of neurofeedback in treating narcolepsy. Thus far we have no publications on this topic.

REM behavior disorder is the opposite of narcolepsy. Ordinarily, our muscles become paralyzed during REM sleep, but in this condition, this REM paralysis does not occur. Therefore, the patient can act out the brain's dream and injuries can result as patients twitch, jerk, talk, and act out their dreams. Not described in the literature until 1985, the onset is usually after age 50. It results from brain stem pathology and is effectively reduced or eliminated 90% of the time with clonazepam. Sleepwalking is also discussed in this chapter. It runs in families, is most prevalent between ages four to eight, and usually disappears after adolescence.

Chapter 10 examines the limits of sleep deprivation and the functions served by sleep. Animal research is reviewed (horses only sleep three hours a day, cats 15 and bats 20 hours daily). In particular, research and theories about the function of REM sleep are discussed. Dement believes it is an important facilitator of brain development after birth, and maybe throughout the life cycle. Sleep deprivation also may impair the formation of long-term memories.

The relationship between sleep, immune function, and a long life are the focus of chapter 11. It has been found that the highest mortality rates in all ages groups are for those who sleep four hours or less nightly, and for those who sleep 9 to 10 or more hours a night. Men who sleep poorly are 6.5 times more likely to have health problems, and females 3.5 times more likely. Furthermore, poor quality of sleep is associated with vulnerability to getting a cold, and how sick one gets. Dement notes that when we fall asleep, levels of immune system molecules (e.g., interleukin-1 and tumor necrosis factor (TNF)—a potent cancer fighter) rise in the blood stream. In fact, TNF rises tenfold while asleep. Thus, natural can-

cer fighters are especially affected by lack of sleep. If we stay up all night, the next day the number of natural killer cells is severely reduced, and staying up until 3:00 a.m. reduces them 30% the next day. Thus, lack of sleep equals impaired immune function and increased susceptibility to viruses and higher cancer risk. Deep sleep (stage 4) is also important for the repair work of growth hormones, which assist tissue repair and the replacement of old, or malfunctioning cells.

“Mood and vitality” is the topic of chapter 12, where research is reviewed showing that not getting enough sleep is associated with being more stressed, less happy, and more physically frail. In fact, a meta-analysis found that “mood is affected more by sleep deprivation than are either cognitive skills or physical performance” (p. 276). The effects of caffeine are reviewed, and Dement opines that if it were a new drug, it would never be approved by the FDA for human use because the side effects outweigh the benefits. He notes that nicotine has a cocaine-like effect on the reward centers of the brain, stimulating dopamine release.

Naturally no book on sleep would be complete without a chapter on dreams, which are reviewed in chapter 13. Chapter 14 focused on creativity and learning. Cognition is one of the first functions to go from lack of sleep, including creativity. The role of REM sleep in memory consolidation received further discussion here. He stresses, “that the time-honored tradition of cramming late into the night for an overdue assignment, whether a final exam or a professional presentation, can be disastrous” (p. 317). The role of high motivation in creativity, but also of dreams and the hypnogogic state are elaborated. This discussion notes famous hypnogogic inspiration in scientific discoveries (the benzene ring, the periodic table of elements), and even in improving the golf swing of Jack Nicklaus. Stephen LaBerge worked with Dr. Dement, and his work on lucid dreaming is briefly reviewed (one in five people have lucid dreams and 60% can with practice learn to direct and control their dreams).

Chapter 15 seeks to facilitate self-assessment of our sleep needs. It includes valuable material for the clinician about how to have a patient keep a sleep diary (complete with a form that is provided). It reproduces the Stanford Sleepiness Scale, and also part of the Epworth Sleepiness Scale. You will learn here how to more specifically give the Multiple Sleep Latency Test, measuring sleep debt and clock-dependent alerting.

Chapter 16 is designed to assist the reader in self-diagnosis of sleep-related problems. He emphasizes that chronic fatigue and depression can be misdiagnosed sleep disorders.

When fatigue is the patient's major complaint, a sleep disorder is the culprit in more than half the cases. If you or anyone you know is plagued by chronic fatigue, I urge you to explore the possibility that a sleep disorder is the cause. For my part, I always assume that fatigue is obstructive sleep apnea until proven otherwise. (p. 349)

Sleep disorders are dramatically under-diagnosed by physicians. This chapter contains good advice for patients regarding dealing with doctors.

The focus of chapter 17 is on prevention and planning ahead for times when it may be difficult to get enough sleep. Of particular value is his discussion of the value of napping. A 45-minute nap improves alertness for 6 hours after, a one-hour nap for 10 hours after, and a 30-minute nap prior to having to stay up all night will prevent a significant loss of performance throughout the night. He emphasizes self-monitoring, and provides detailed and extensive suggestions for dealing with jet lag and shift work. In chapter 18, he explains how sleep changes throughout the aging cycle complete with recommendations for the unique needs of children, teenagers, and older adults. Chapter 19 contains recommendations for a "sleep-smart lifestyle."

The final chapter presents Dr. Dement's "three-week sleep camp" program for implementing his suggestions systematically to alter one's lifestyle. It is specific, practical, and realistic in tone (e.g., expose yourself to sunlight every morning; dim lights an hour before going to bed; avoid caffeine after mid-afternoon).

I strongly recommend this book to fellow clinicians, for yourselves personally and to educate you about working with sleep disorders in patients. Your patients will enjoy it too.

*D. Corydon Hammond, PhD*