

The Absolute Essentials of Sleep Knowledge

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The goal of this talk is to inform you all so that the next time what we call a “sleep crisis” occurs, you will instantly get out of harm’s way. Whether it is behind the wheel or countless other “at risk” situations, you will learn that **drowsiness is red alert!**

As we enter this new millennium, we have “miles to go before we sleep.” Therefore, until everyone has an educational experience that systematically covers the vast domain of sleep, we must do our best to disseminate a few absolutely crucial facts to anyone who will listen. After considering this issue in one form or another for quite a few years, I have selected a relatively few “highest priority” areas of sleep knowledge that everyone must know and understand and remember in order to foster health, productivity, safety, and permanently enhanced quality of life.

The following brief outline of these topics is intended to provide something to help remember the talk. We hope each student will be able to answer affirmatively to the question, “Have I completely understood and absorbed each of these issues and their ramifications?”

1. Sleep Need and Sleep Debt. Each of us has a specific daily sleep requirement. This is the amount of sleep that must be obtained each day on average to avoid becoming sleep deprived. The vast majority of adults would fall within the range of 8 hours plus or minus one hour. Teenagers need more. If the needed amount is not obtained, a sleep debt is created. The sleep that is lost on successive nights accumulates progressively as a larger and larger sleep debt. The larger the sleep debt the more powerful is the tendency to fall asleep in the daytime. If the sleep debt is large enough, falling asleep absolutely cannot be avoided. When people are chronically sleep deprived and don’t know it because they don’t know their specific individual sleep requirement, they tend to think of themselves as fatigued, tired, apathetic, unmotivated, exhausted, etc. In the overwhelming number of instances, these feelings are manifestations of a large sleep debt.

2. Drowsiness/Sleepiness. The onset of sleepiness or drowsiness is the moment when staying awake and attentive requires a conscious effort. Most commonly, this is needing to make a conscious effort to keep the eyes open. Drowsiness is the last step before falling asleep, not the first. In any hazardous or potentially hazardous situation such as driving, the onset of drowsiness should be regarded as a red alert- a powerful signal to get out of harm’s way instantly. Strong external and internal stimulation during wakefulness can mask the strong underlying tendency to fall asleep associated with a large sleep debt. If drowsiness occurs soon after a transition from being active and moving about to a sedentary situation such as driving, it is likely that your sleep debt is huge and very dangerous.

3. How Much Sleep Does Any Particular Person Need? “Sleep need” is defined as the amount of sleep which, if obtained each day on the average, will forestall a progressive increase in our sleep debt. For each human being, there is some specific amount of sleep which, if obtained each night, will produce **no change** in the way you feel in the daytime. This nightly amount is an individual person’s daily sleep requirement.

4. What Is the Biological Clock? The biological clock is the term applied to the brain process which drives 24-hour oscillations in body temperature, hormone secretion, and a host of other bodily activities. An important scientific breakthrough was the discovery of the precise location of the biological clock in the brain. It is housed in two tiny bilateral areas called the suprachiasmatic nuclei. From the perspective of our daily life, the most important function of the biological clock is to foster the orderly 24 hour alternation of sleep and wakefulness.

5. Clock-Dependent Alerting is a powerful internal signal arising from your biological clock (suprachiasmatic nuclei) which alerts the brain and opposes the tendency to fall asleep. **Clock-dependent alerting (CDA)** fosters consolidated periods of peak performance, high energy, and optimal internal function during specific periods in your daily cycle. When the clock and dependent alerting process turns off, your even larger sleep debt is unopposed. If your overall sleep debt is relatively low, CDA is sufficient to keep you awake and alert all day even in the absence of other sources of stimulation.

6. The Opponent Process Model. Sleep is regulated homeostatically. All this means is that if you get less sleep than you need, the tendency to fall asleep in the daytime will become progressively stronger (see above); if you get more sleep than you need, the tendency to fall asleep in the daytime will become progressively weaker. CDA and the homeostatic sleep drive are independent neural processes (opponent process) which oppose each other and interact to regulate the daily cycle of sleep and wakefulness in an optimal manner.

7. All Wakefulness is Sleep Deprivation. Regardless of how we feel when we are awake—tired, elated, energetic, apathetic, interested, bored, **all wakefulness is sleep deprivation.** From the time we wake up in the morning until the time we go to bed and fall asleep at night, the homeostatic mechanism in our brains is keeping track and responding. Some people apparently believe they are not being sleep deprived unless they feel tired. Wrong! For example, being awake from 8 AM until noon is usually not thought of as sleep deprivation. Nevertheless, it is. In order to sleep through the night, it is necessary to be sleep deprived (awake) during the prior approximately 16 hours.

8. Drowsiness is Red Alert! Surveys indicate that at least 80% of us know when we are about to fall asleep. We know because we feel “drowsy.” Most of us associate “drowsiness/sleepiness” with heavy eyelids, difficulty keeping the eyes open, and difficulty concentrating.

It is obviously terribly dangerous if you are having difficulty keeping your eyes open while you are driving. If, at this moment, you try to fight off the drowsiness by turning up the radio, opening the window, or slapping your face, you are playing Russian Roulette with three or more bullets in a six chambered revolver.

The feeling of drowsiness is Red Alert! If you don't respond immediately, you will die. Drowsiness means a large sleep debt is winning the battle for your mind and brain. There is only one appropriate response. **Get out of harm's way immediately!** If getting out of harm's way means getting off the road and taking a nap, or turning off a dangerous machine, this is what you **must** do as a responsible human being.

It is irresponsible and unacceptable to drive drowsy. Driving drowsy is exactly the same as driving drunk! Even if you choose to risk your own life and health, you have absolutely no right whatsoever to risk the lives of others.

9. The True Nature of Sleep. Sleep is not rest for the brain. Your brain is always active. If you believe that your brain is turned off during sleep, then it would be appropriate to say the brain **never** sleeps. At the very least, the brain never rests.

The one absolutely defining difference between wakefulness and sleep involves our consciousness. When awake, we are conscious of the real world and maneuver ourselves through its many challenges primarily in the service of survival. At the moment of sleep, our consciousness of the real world is completely shut down and we are conscious only of the inner world.

10. The Awake Brain Is Always Trying to Go to Sleep. There is no such thing as a passive, natural state of sleep, nor is there a passive, natural state of wakefulness. There are specific active brain mechanisms that promote sleep and there are specific active mechanisms that promote wakefulness.

Your waking brain, driven by its homeostatic sleep mechanism, is always trying to go to sleep. During the day, CDA generally makes it very difficult to fall asleep. However, there is some large amount of sleep debt that will eventually overwhelm clock dependent alerting and every other kind of stimulation. At this moment, sleep will seize your brain.

11. Post Hoc Ergo Propter Hoc (*Translated from the Latin*) **After This, Therefore Because of This.** This is the most common and classic logical fallacy. There is a marked tendency for human beings to assume that a consistent ordering of events proves causality. In American society, the assumption that lack of stimulation causes sleep to occur may be our greatest popular delusion. We assume that boredom, a dull lecture, an overly pedantic teaching videotape, a droning voice are direct causes of sleepiness and sleep. Wrong! Almost everyone assumes that eating a heavy meal causes sleepiness. Wrong! Large scale surveys have shown that about 90% of our population experiences sleepiness after lunch, and assume lunch alone is the culprit. Wrong!

12. The Sleep Debt “Unmasked.” As noted, most people think that a heavy meal, a warm room, a comfortable bed, a boring lecture, an alcoholic beverage are direct causes of sleepiness. As we have clearly states, none of these things cause sleepiness. Rather, they unmask sleepiness. If there is no sizeable sleep debt, lunch, boredom, alcohol, etc. will **not** be followed by sleepiness. Anytime you feel drowsy in the daytime, particularly in class, you must conclude you have a sizeable carry-over sleep debt. Drowsiness is absolutely **not** the inevitable consequence of lack of stimulation.

13. More Post Hoc Ergo Propter Hoc. The other most common and serious logical fallacy involving sleep and wakefulness arises from the fact that the strongest period of clock-dependent alerting occurs late in the day in adolescents and young adults. At this age level, most people have the daily experience of being tired, fatigued, apathetic, or even drowsy and struggling to stay awake in the middle of the day, particularly in early afternoon classes. And then, even without sleeping, these feelings go away. Feeling tired and drowsy generally gives way to increasing alertness, high energy and high motivation, and generally feeling wide awake. The typical sequence leads to the erroneous conclusion that not only is drowsiness caused by lunch, but it is a transitory phenomenon as well. It is almost impossible for a naïve individual to conclude that sleep debt accumulates when its effect obviously goes away.

14. We Can Be Asleep Without Knowing? People have a wide range of subjective sensitivities. It is clear that people who have fallen asleep for a few moments will deny it. In sleep deprivation situations, there can be microsleeps which subjects deny. However, we believe that human beings can learn to be more sensitive.

15. Can We Get Too Much Sleep? In many surveys, more than 70 percents agreed or strongly agreed with the statement, “It is possible to get too much sleep.” Apparently, many people have experienced feeling lousy or groggy after an unusually long sleep. To conclude that this is due to “too much sleep” is wrong. Sleep is not the culprit. This is a very important point because the erroneous belief is a barrier to acquiring healthy sleep habits.

16. More About Normal Sleep. Of course, there is a lot more to say about sleep. A fundamental fact is that sleep consists of two entirely different organismic states. One kind of sleep is called REM, and the other is called non-REM. While they are very different from one another, both kinds of sleep possess the defining characteristics discussed earlier in this section—perceptual disengagement. Both kinds of sleep occur every night, and they alternate with one another every 90 minutes on the average.

17. Sleep Disorders. Sleep specialists currently diagnose 88 specific disorders, all of which were accurately and comprehensively described only after 1970 when the world’s first sleep disorders clinic opened at Stanford. Some are both very common and very serious. **Altogether, at least three quarters of all adults have one or more diagnosable sleep disorders.** Sleep disorders are less common in teens.

18. Breathing during Sleep. Quite possible the single biggest health problem in the entire world involves impaired breathing during sleep. Obstructive sleep apnea is among the most common chronic illnesses that human beings suffer. Untreated, it progresses to disability, overwhelming fatigue, and cardiovascular disease. Death often occurs from heart attack, stroke, cardiac arrest, or a falling asleep accident. It is likely that every student knows someone with sleep apnea. While not everyone who snores has obstructive sleep apnea, all snorers do have impaired breathing during sleep. A person who has obstructive sleep apnea cannot breathe while asleep because the throat closes and prevents airflow.

19. Are Physicians Generally Familiar with Sleep Disorder? No.

20. America Is a Sleep Society. How many Americans are seriously or dangerously sleep deprived? There is no doubt whatsoever that vast numbers of us in school, in the workplace, in the transportation industry, in a variety of service industries, and particularly, in shift work situations, are carrying a dangerously large sleep debt.

21. Remember—Drowsiness Is Red Alert! If you recall nothing else from my talk, remember—drowsiness is red alert! For the rest of your life, this phrase should leap to your mind automatically whenever your eyelids start to get heavy, whenever you would like to close your eyes for just a few second because keeping them open is getting difficult. When you begin to feel drowsy, you have arrived at the edge of the abyss. Step back! Get out of harm's way! **Drowsiness is red alert!**