



IMAGE AWARENESS WELLNESS INSTITUTE

Sleep and Health

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VITAMIN “S”

Lack of this replenishing nutrient results in profound changes in mood, motivation, and vitality. It is a major contributor to depression and a sense of futility in life. Its effects, however, go far beyond the mind. Lack of vitamin “S” increases the probability that one will become obese and develop diabetes. Can you guess which nutrient this is? We are all familiar with it and know that we need it to feel well, yet most of us understand it only poorly. If you guessed sleep, you are correct.

THE CONCEPT OF SLEEP DEBT

William C. Dement is the world’s leading authority on sleep. One of the crucial understandings he attempts to communicate to laypeople is the concept of sleep debt. He writes, “Generally people need to sleep one hour for every two hours awake, which means that most of us need around eight hours of sleep a night.”¹

An important point of understanding regarding sleep debt is that it is not possible to miss sleep one night and make up for the lack of sleep the next night. In Dement’s words, “The brain keeps an exact accounting of how much sleep it is owed....we discovered that the effect of each successive night of partial sleep loss carried over, and the effect appeared to accumulate in a

precisely additive fashion.”²

The larger sleep debt we accumulate, the more it tends to impair our overall functioning. A heavy sleep debt decreases energy and vitality. It alters mood making us irritable and surly. The greater sleep debt we accumulate the more likely we will be glum and depressed.

Sleep debt also taxes the brain. We become less alert. Our ability to understand what is going on around us is impaired. We tend to throw caution to the wind and to make decisions we would never make in a well-rested state.

REFERENCES

1. Dement, William C., *The Promise of Sleep*, New York: Dell Trade Paperback, 1999, 57.
2. Dement, 60.

AROUSAL

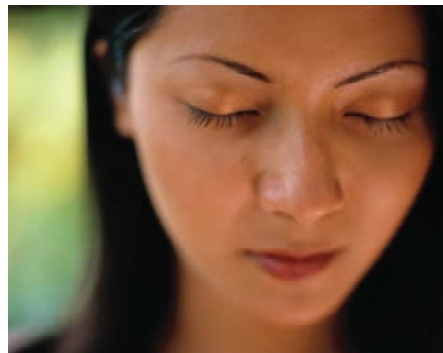
We would sleep all the time if we did not have an arousal mechanism buried within the brain. The most powerful factors that influence alerting are the clock and light. The body likes to fall into a rhythm of waking

at a particular time. There are usually two clock-dependent alerting periods over the course of a day. For most people these are first thing in the morning and late in the day.

The presence of two arousal periods explains why it is easy for someone to fall asleep in the middle of the day and yet find it impossible to fall asleep early in the evening. It is a mistake to attempt to sleep when the body is receiving arousal signals. This becomes a major problem when we travel from one time zone to another as clock-dependent alerting signals do not change rapidly.

A powerful influence on setting the time of alerting signals is intense light. Thomas Edison developed the electric light bulb in 1879. Prior to this time the sleep cycles and periods of alerting for most people were set by the rising and setting of the sun.

Edison changed all of that. We now stay up much later than previous generations. It has been estimated that average sleep has decreased from 8-9 hours in the 1960’s to an average of about 6.9-7.0 hours in 2000-2002. This data is indicated by polls taken by the National Sleep Foundation.¹ Overall sleep has decreased by 1.5 to 2 hours in this period of time. It is not uncommon for people today to sleep only 5 or 6 hours a night. Sleep time is often spent watching television, videos, or sitting in front





of a computer. Rest and sleep were undoubtedly much longer prior to the development of the light bulb and the more modern electronic age.

Eve Van Cauter and her associates write, "Sleep curtailment is a hallmark of modern society, one that is often considered harmless and efficient. The advent of artificial light has permitted the curtailment of sleep to the minimum tolerable and an increase in the time available for work and leisure. In our 24-hour-a-day society, millions work during the night and sleep during the day, a schedule that generally results in substantial sleep loss."¹

This decrease in sleep affects health in many ways. The highest death rate for all ages is among those who sleep less than 4 hours a night. The lowest death rate is for those who regularly sleep 8 hours a night.

The fact that alerting is triggered and clock dependent arousal is set by light exposure suggests that it is undesirable to be exposed to bright light at night. Not only does light tend to wake us up and make it difficult to sleep, but it also alters a number of hormones with profound effects upon health.

Red night lights are the least likely to trigger hormone alterations and are the best to use for nighttime illumination. Red light does not trigger the wake up center in the brain.

REFERENCE

1. Cauter, Eve Van, et al, The impact of sleep deprivation on hormones and metabolism, *Medscape Neurology & Neurosurgery* 2005; 7(1).

HORMONAL EFFECTS OF SLEEP DEBT

Sleep has profound effects upon appetite and blood sugar. Eve Van Cauter and associates published a study in 2005 demonstrating that sleep deprivation reduced thyroid stimulating hormone by 30%. Growth hormone which has an anti-insulin action split from one pulse to two pulses with 4 hours of sleep a night.¹

Most significant are alterations in leptin and ghrelin with sleep deprivation. Leptin is a hormone released by fat cells that suppresses appetite and tells us we are full and satisfied. After 6 days of only 4 hours of sleep a night leptin levels dropped signaling famine (particularly during the night time hours) while subjects were well-fed. In two different studies of sleep deprivation leptin levels dropped 16-18% within only a few days.

Ghrelin is a hormone which stimulates appetite, particularly for high-carbohydrate foods. Sleep deprivation causes significant increases in ghrelin. Ghrelin levels rose between 15% and 28% in different sleep deprivation studies.¹

These alterations in the appetite regulating hormones suggests that lack of adequate sleep can increase the probability that we will gain weight and become obese.

REFERENCE

1. Cauter, Eve Van, et al, The impact of sleep deprivation on hormones and metabolism, *Medscape Neurology & Neurosurgery* 2005; 7(1).

BLOOD SUGAR EFFECTS OF SLEEP DEBT

A study of the effect of limiting the sleep of young men to 4 hours a night for six nights was studied to see how this would influence blood sugar. The subjects were then allowed to recover from their sleep debt and reexamined.

Lack of sleep created insulin re-

sistance. Blood sugar levels of the sleep deprived young men were higher after breakfast despite the fact that their insulin levels are normal or elevated. Peak glucose levels after meals were 15 mg/dl higher when sleep deprived.

The ability to clear glucose from the blood stream slowed by 40% among the sleep deprived volunteers and insulin response to glucose fell by 30%.

The researchers concluded that the sleep deprivation altered the blood sugar coping mechanisms of the body sufficiently that these young men had an insulin response similar to that of pre-diabetic older adults with impaired glucose tolerance.¹

Fortunately, all measures were restored to normal after repaying the sleep debt by sleeping 12 hours a night. These studies strongly suggest that sleep deprivation contributes to the risk of abnormal blood sugar regulation and diabetes.

REFERENCE

1. Cauter, Eve Van, et al, The impact of sleep deprivation on hormones and metabolism, *Medscape Neurology & Neurosurgery* 2005; 7(1).

SLEEP DEBT AND ALCOHOL

A significant study demonstrating the interaction between sleep debt and alcohol consumption was conducted at Henry Ford Hospital Sleep Disorders Center. Volunteers slept 10 hours for one week followed by 8 hours of sleep for a second week. This was followed by a "social weekend" where they were only allowed 5 hours of sleep a night.

The volunteers were given either an alcoholic beverage or a pla-





cebo after each segment of the experiment. The alcohol created only a slight sleepiness after a week of sleeping 8 hours a night. The same dose of alcohol had no discernible effect after 10 hours of sleep a night. The same dose of alcohol made the volunteers "severely sleepy and barely able to stay awake" after 2 nights of five hours sleep.

Alcohol becomes a powerful sedative when combined with inadequate sleep. The combination of these two factors can create a "fatal fatigue" when driving or engaging in other high risk activity.

Sleep deprivation and alcohol consumption can have similar effects upon the body. Australian researchers found that after 17 hours awake at 1:00 a.m. when our alerting signals are declining volunteers had the same hand-eye coordination scores as those with blood-alcohol levels of .05%. After 24 hours without sleep their scores were the same as those with a blood alcohol level of 0.1 percent.

REFERENCE

Dement, William C., *The Promise of Sleep*, New York: Dell Trade Paperback, 68, 231-2.

SLEEP APNEA

One of the most common causes of loss of sleep is snoring and sleep apnea. Dement found that 40% of the population suffers some sleep apnea and half of these cases are medically significant.

The word apnea means absence of breath. The throat relaxes during sleep. Many people, particularly those who are overweight, will have the throat partially close during

sleep resulting in loud snoring, or totally close resulting in sleep apnea. Most people with apnea snore.

The closing of the throat robs the body of life sustaining oxygen and forces the sleeper to wake in order to breathe. For this reason, almost all of those who suffer with serious sleep apnea are also sleep deprived.

The victim of sleep apnea becomes more accident prone as a result of lack of sleep. One survey found that 15.6% of those with apnea had had at least one automobile accident compared with 6.7% of those who did not suffer with the condition.

REFERENCE

Dement, William C., *The Promise of Sleep*, New York: Dell Trade Paperback, 167-193, 229.

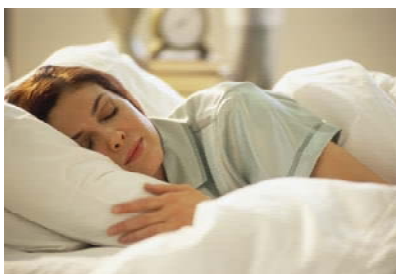
FATAL FATIGUE

The greater the sleep debt accumulated the more impaired we become. Eventually we arrive at what Dement calls "fatal fatigue." At this point we can put our own lives or the lives of others in danger.

Dement observes that people are terrible at guessing if they are likely to fall asleep. Many people fall asleep and deny that they did so afterward.

Lack of sleep is involved with many assembly line and transportation accidents. Higher profile accidents also involve sleepiness.

Mark Rosekind, a sleep researcher, attached portable EEG machines to airline pilots flying long routes at night. He found that their reaction times decreased by 25%. He also found that pilots were falling asleep during the flights despite the fact that



they were being monitored. Five of the nine pilots studied lapsed into microsleep during the last 10 minutes of their flights! Pilots were actually lapsing into brief sleep episodes while they were descending and landing their planes!

Doctors and nurses are notorious victims of sleep deprivation and subsequent unnecessary errors. An anonymous survey of a San Francisco hospital found that 42% of the staff admitted killing at least one patient by making a fatigue-related mistake. William Dement tested numerous nurses and resident physicians and found only one who was not suffering serious sleep deprivation.

One-third of automobile accidents are caused by sleepiness. Almost one-third of adult drivers report that they have dozed off at the wheel. Among the most sleep deprived of all are long-haul truck drivers. They are in Dement's words "penalized for getting a decent night's sleep." Truck drivers also have three times the incidence of sleep apnea of the general population. This increases their chances they will not obtain adequate sleep.

Some of the actions we perform when sleep deprived are humorous. Dement tells of a woman who loaded her dishes into the clothes dryer instead of the dish washer and only realized her error when she heard the sound of breaking dishes.

Other actions are less so. Chernobyl melted down in the early morning hours when workers were too sleep deprived to respond to critical warnings.

Sleep deprivation is a condition which needs to be treated. For further information read William Dement's excellent book *The Promise of Sleep*.

REFERENCE

Dement, William C., *The Promise of Sleep*, New York: Dell Trade Paperback, 217-233.



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SLEEP EVALUATION QUIZ

- Yawn frequently
- Difficult to get out of bed in the morning
- Sleep less than 7 hours a night
- Snore while sleeping
- Suffer with sleep apnea
- Become sleepy after the noon meal
- Become sleepy after drinking alcoholic beverages
- Frequently irritable or angry with little reason
- Eyes feel heavy when driving
- Have fallen asleep while driving
- Fall asleep sitting and reading
- Fall asleep watching television
- Fall asleep in a classroom, theater, or meeting
- Fall asleep driving in a car with someone
- Fall asleep sitting and talking

William C. Dement writes, "we can state with confidence that if you feel sleepy or drowsy in the daytime, then you must have a sizeable sleep debt."

MULTIPLE SLEEP LATENCY TEST (MSLT)

- Fall asleep within 5 minutes of going to bed
- Fall asleep within 5-10 minutes of going to bed
- Fall asleep within 10-15 minutes of going to bed
- Takes longer than 15 minutes to fall asleep

Most of us tend to think that if we are dead tired and fall asleep within minutes of the time our head hits the pillow it is a good sign. Dr. William C. Dement, founder and director of the Stanford University Sleep Research Center, found that those who fell asleep within 5 minutes were suffering from extreme sleep deficiency. These individuals had severely impaired physical and mental reactions due to accumulated sleep debt.

Those who fall asleep within 5-10 minutes carry considerable sleep debt and often operate at borderline mental and physical efficiency.

Those who fall asleep within 10-15 minutes carry a manageable sleep load, while those who require 15-20 minutes to fall asleep usually have excellent alertness and physi-

cal stamina.

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Dement, William C., *The Promise of Sleep*, New York: Dell Trade Paperback, 67.

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