

Northwest Health Connections

Sleep and Sleep Disorders

Why do we sleep? Why do we need to sleep? Medical science hasn't quite figured that out yet. But we do know that a lot of bad things can happen to our minds and bodies if we don't get enough sleep. Yet in today's fast-paced, high-tech, high-pressure society, sleep is almost always the first thing we sacrifice when we find that there aren't enough hours in a day to accomplish everything we want to accomplish. Maybe we need to re-think that.

Animals that are totally sleep-deprived die after 14 days. In an experiment in which rats were deprived of sleep, thyroid hormone levels fell, stress hormones rose, and necrotic skin lesions formed. In humans, we know that cortisol (a stress hormone) rises with lack of sleep. So does ghrelin, the hormone that stimulates our appetite and makes us gain weight. Conversely, human growth hormone (which spurs growth in children and adolescents and helps to regulate metabolism) and leptin (a hormone which serves as an appetite suppressant and helps us lose weight) are only produced in adequate amounts when we receive enough sleep. Hint: if you want to lose weight, get more sleep.

There are several theories as to why we sleep. One is that sleep provides a restorative function to the body, and that it "regenerates" from sleep. Another is that it gives the brain an opportunity to sift through the events of the day and process information ("memory garbage") that cannot be processed during the day while we are awake. The "energy conservation" theory states that sleep is a way for the body to regularly slow its metabolism and thereby conserve energy. Still another theory suggests that sleep correlates with structural and organizational changes in the brain ("brain plasticity"), thereby allowing the brain to adapt to its environment. Whatever the reason, it is clear that we all need a certain amount of sleep.

CIRCADIAN RHYTHMS

The body possesses an internal clock of its own that regulates its biological processes over a period of a little over 24 hours. Circadian comes from Latin, "circa diem," meaning "about a day." A tiny structure in the hypothalamus of the brain called the suprachiasmatic nucleus (SCN) governs the production of melatonin from the pineal gland (which makes us drowsy and signals that it is time to sleep) as well as that of other hormones. Light signals from the eyes travel through the optic nerves to the SCN, which tells the brain to shut off melatonin because it is daylight. As nightfall approaches, melatonin is released again, and we sense that it is time to sleep. Our circadian rhythms can be affected by external time cues (alarm clocks, artificial light). Jet lag happens when we cross time zones. It takes a while for the body to adjust to the new external time cues. Since sunlight is such a powerful cue for sleep regulation, people who work odd shifts often are drowsy during work. Medical interns working the night shift are twice as likely as others to misinterpret hospital test records, which could endanger patients. The frequency and severity of workplace accidents tend to increase at night.



THE SLEEP CYCLE

There are five stages of sleep. Stage 1 sleep is very light; a drowsy state that usually lasts 5-10 minutes. Eye movements slow down. People sometimes notice a feeling of falling, followed by sudden muscle contractions called "hypnic myoclonia." Brain waves - called Alpha waves - measure 8-13 cycles per second. Beta waves, measuring between 13 and 40 cycles per second, occur during the waking state.

In stage 2 sleep, eye movements stop and brain waves slow down to Theta frequency (4 - 7 cycles per second), with occasional bursts of rapid waves called sleep spindles. We spend about 50% of our sleep time in stage 2 sleep.

Stages 3 and 4 are called deep sleep. There is no eye movement or muscle activity. Brain waves slow to Delta frequency (4 cycles per second). This is when the body seems to repair and regenerate tissues, builds bone and muscle, and strengthens the immune system. If a person is awakened from deep sleep, he may be groggy and disoriented, confused, even uncooperative. Please keep this in mind if you must awaken a resident for toileting, medication, or a fire drill. Some children experience bedwetting, night terrors, or sleepwalking during deep sleep. All of the first four stages are called non-rapid eye movement sleep.

Rapid Eye Movement (REM) sleep begins at about 90 minutes after the onset of sleep. During REM sleep,

breathing becomes more rapid, irregular and shallow, eyes dart rapidly back and forth, heart rate and blood pressure increase, and we experience dreams. One theory states that dreaming is the brain's way to sift through the day's thoughts and eliminate "memory garbage." Another holds that repetitive dreams indicate that some issue is bothering a person. It is believed that during REM, memory reorganization and new learning take place, and neurotransmitters are replenished.

After the first REM segment, sleep moves back through stage 2 and repeats the cycles (except for stage 1) through the night until the individual wakes up. The amount of REM sleep increases with each cycle, until the longest REM segment of about 60 minutes. The total of REM during the night is about 100 minutes. As REM sleep increases, deep sleep decreases, until the person awakens.

Nightmares can occur occasionally. They are vivid, disturbing dreams, such as attempting to run from danger and feeling like you cannot move your legs. Nightmares are often spontaneous, but they can recur. Certain medications such as amphetamines, narcotics, antidepressants and some blood pressure medications can cause them. They can also be symptoms of anxiety, depression, or post-traumatic stress disorder. Fever, fatigue, stress, alcoholism, or even pregnancy may cause nightmares. Nightmares may accompany sleep disorders such as Restless Legs Syndrome.

HOW MUCH SLEEP DO WE NEED?

No one knows for sure, but it does depend on age. What we do know is that infants tend to sleep about 16 hours a day for the first two weeks after birth, and this decreases to 12 hours a day by about 3 years of age. By the time the child is a teenager, the average is about 8-9 hours a night. Most sources indicate that adults should get between 7.5 and 9 hours of sleep every 24 hours, and this can vary from person to person. What we do know is what happens to us when we don't get enough sleep.

Concentration and mental clarity suffer from lack of sleep. Sleep deprivation causes a multitude of problems: short-term effects include irritability, forgetfulness, inability to focus, impaired judgment, and increases in work injuries and car accidents. In fact, research has shown that driving drowsy can be more dangerous than driving drunk. Long-term effects of lack of sleep include anxiety,

depression, heart disease, hypertension, a shortened life span, and lack of sex drive. Sleep is essential for proper hormone function. Human Growth Hormone (HGH) is greatest during sleep. Thyroid hormones are adversely affected if the body does not receive adequate sleep. Cortisol, a stress hormone, increases without enough sleep, and it breaks down collagen, which helps skin maintain its elasticity and smoothness. Yes, lack of sleep can make you look older. And if that isn't enough, when we don't get adequate sleep, we just plain don't feel good.

Sleep deprivation causes a multitude of problems.



TIPS FOR A GOOD NIGHT'S SLEEP

Try to get to bed at the same time every night. You should have a cool, dark environment in which to sleep (not so cool that it is uncomfortable). Avoid the television, computer screen, and bright lights just before bedtime, since your natural production of melatonin (a hormone that regulates sleep) the evening so that you won't have your sleep milk may be relaxing, though, because milk drowsy. A warm bath can be relaxing. Avoid make you tired but reduce the amount of REM amounts of REM time and sleep lightly). Just as considered personal hygiene, a ritual that helps prepare you for a good night's sleep is called "sleep hygiene."



decreases with light exposure. Limit fluid intake in interrupted by a bathroom trip. A small glass of contains tryptophan, a chemical that can make us caffeine (a stimulant), alcohol and Benadryl (they sleep), and cigarettes (smokers have decreased routine bathing, shaving and brushing teeth are

considered personal hygiene, a ritual that helps prepare you for a good night's sleep is called "sleep hygiene."

SLEEP DISORDERS

Over 40 million Americans suffer from chronic sleep disorders; another 20 million have occasional problems sleeping. Many sleep disorders are thought to be genetic. Sleep disorders cost over \$16 billion a year. Often, problems sleeping may be a symptom of an underlying medical or mental health disorder.

INSOMNIA

Insomnia is lack of quality sleep, inability to fall asleep, or an inability to stay asleep, experienced by everyone occasionally. It tends to increase with age and occurs in 40% of men and 30% of women. Short-term insomnia may be treated with sleeping pills (hypnotics) such as Ambien or benzodiazapines such as Ativan. However, these pills can be habit-forming, can interfere with quality sleep, and are not recommended for long-term use. Using light therapy and sleep hygiene can help a person establish more consistent sleep patterns. Examining one's lifestyle and sources of stress can be helpful. For chronic sufferers, it is necessary to explore possible co-existing medical problems and/or mental illness. There seems to be a high correlation between schizophrenia and insomnia. A gene labeled "SNAP25" is important in the circadian system, and abnormalities with this gene have been linked to schizophrenia. It is always best to consult your physician before attempting any natural (melatonin, botanicals such as valerian root) or over-the-counter (Unisom, Sominex) treatments.

OBSTRUCTIVE SLEEP APNEA (OSAP)

In this disorder, the airway is blocked for brief periods of time during sleep. The individual's effort to inhale causes a suction that collapses the windpipe, blocking air flow for 10-60 seconds, lowering the blood oxygen level, triggering the brain to awaken the person, usually with a snort, in order to resume breathing. This can literally happen hundreds of times a night, causing the person to be chronically tired, irritable, and depressed. People with untreated OSAP are 2-3 times more likely to have automobile accidents than the general population. It can lead to hypertension, an irregular heartbeat, and an increased risk of heart attack or stroke. Changing positions from lying on one's back to side-lying or sleeping in a chair can be of benefit. Obesity often contributes to sleep apnea, and sometimes if the individual loses enough weight, the problem resolves. The number one symptom of this disorder is snoring (which can cause a spouse to experience insomnia). Snoring is not normal. A common treatment is a positive pressure air flow device (C-pap or Bi-pap) which is worn when sleeping. Some people need surgery to correct the structural problem causing the apnea.

RESTLESS LEGS SYNDROME (RLS)

RLS is characterized by unpleasant crawling, tingling or pricking sensations in the legs and feet, accompanied by a compulsion to move the legs in order to get relief. This affects over 12 million Americans, mostly elderly people, and causes insomnia. The cause is unknown; it may be genetic. Medications that have an effect on dopamine levels (Requip, Mirapex), opioids (Oxycontin), and muscle relaxers have been helpful in relieving symptoms.



NARCOLEPSY

Narcolepsy causes sudden, frequent "sleep attacks," lasting up to 30 minutes, which can occur several times a day, during any activity, even though the individual has had a full night's sleep. It is thought to be genetic, and is treated with stimulants (Provigil) and antidepressants to control the symptoms. There is no known cure. Approximately 250,000 Americans suffer from this disorder.

SLEEP ENURESIS

Enuresis, or “bed-wetting,” is typically seen in children. Causes include small bladder, urinary tract infections, severe stress, and developmental delays that interfere with toilet training. This tends to run in families and may be hereditary. Children with sleep enuresis are often heavy sleepers who fail to awaken when their bladder is full. 7% of boys and 3% of girls experience this at age 5, and the percentages drop with age. Diagnosis is by history, physical exam, checking blood sugar levels, kidney function, and hormone levels, along with a review of medications. Behavior therapy works in 75% of cases. Urine alarms that sound when the bed gets wet can help the child learn to respond to bladder cues. Bladder training and scheduling trips to the bathroom at increasingly longer intervals can help. Avoiding eating or drinking 2 hours before bedtime can be effective. Most children simply outgrow the problem, and only 1% continue enuresis into adulthood.

SLEEP DEBT

Sleep is the one area that people try to cut back on in order to accomplish more in their lives. But there is a price to pay. In one study, 9 adults lived on a reduced sleep schedule of 5.6 hours a night for 3 weeks. Although most participants caught up on short-term sleep deprivation with one good night of 10 hours of sleep, the effects of long-term deprivation persisted. Once they woke up, for every hour spent awake, their performance on tests and their motor skills deteriorated, especially late at night. If you routinely fall asleep within 5 minutes of lying down, or are drowsy when you should be awake (at work, driving, mowing the lawn, etc.), then you are sleep deprived. If you experience microsleeps, you are sleep deprived. Microsleeps are brief, unintended episodes or loss of attention associated with events such as a blank stare, head-snapping, or prolonged eye closure which may occur when a person is fatigued but trying to stay awake but perform a monotonous task like driving a car or staring at a computer screen. The more sleep-deprived a person is, the greater the chance that a microsleep episode will occur. Continuing to sleep less than the recommended 7.5-9 hours per night is not something we can “get adjusted to.” Chronic sleep deprivation will not only

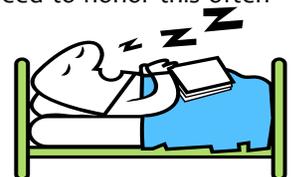
make us chronically tired, but will set us up for several health problems.

Sleep is necessary for hormone regulation in a couple of ways. First, it is necessary in order that the Pituitary (the “master gland”) and the Hypothalamus (“hormone releaser”) function properly. Since these two glands have a controlling influence on most of the other hormones, lack of sleep can have widespread detrimental effects on HGH, reproductive hormones (follicle stimulating hormone, gonadotropin, estrogen, progesterone and testosterone), insulin, ghrelin, leptin, thyroid hormones, and adrenal hormones. The other way that sleep deprivation harms us is through the autonomic nervous system. During sleep, sympathetic nervous system (stress response) activity is decreased and parasympathetic (normal, everyday living) activity is increased. Most of the endocrine organs are very sensitive to the balance between the sympathetic and parasympathetic nervous systems. Since the nervous system and the hormones pretty much dictate all bodily functions, it follows that how much sleep we get has a major impact on our well-being. Increases in pulse, respirations and blood pressure would certainly reflect an increase in sympathetic nervous system activity. Chronic vasoconstriction (narrowing of blood vessels), insulin resistance and obesity caused by sleep deprivation can increase the risk of stroke or heart attack.

Two hormones directly impacted by lack of sleep are Ghrelin (appetite stimulant, making us hungry) and Leptin (appetite suppressant, causes us not to feel hungry). Ghrelin increases when we don't sleep enough, and Leptin decreases. The result is weight gain. In addition, lack of sleep predisposes people to Type 2 Diabetes. Glucose tolerance becomes poor. Weight gain and visceral fat (fat around the organs) increase insulin resistance. In a study of young, healthy adults who averaged 4 hours of sleep for 6 days, blood glucose levels were higher after breakfast during the state of sleep debt than they were when the subjects were getting adequate sleep, despite normal or even slightly elevated insulin responses!

CONCLUSION

Medical science continues to explore exactly what purposes sleep has, how it benefits us, and how much sleep we really need, so there are still many questions about sleep that need to be answered. But it is clear that we all need to honor this often-neglected aspect of caring for ourselves and reap its many benefits!



Sleep and Sleep Disorders Test

Name: _____ Title: _____

Agency: _____ Date: _____

Please provide contact information (email address, fax number, or mailing address) where you would like your certificate to be sent:

Please answer the following questions and return this test to Northwest Health Connections.

1. Eventually your body will adjust to shorter sleep times. True False
2. The amount of sleep we need depends on our age . True False
3. Driving drowsy can be more dangerous than driving drunk . True False
4. It is normal to snore while sleeping. True False
5. Sleep deprivation can lead to Type 2 Diabetes. True False
6. Narcolepsy can be cured with medication. True False
7. People with schizophrenia often have insomnia. True False
8. A person with obstructive sleep apnea always needs surgery to resolve the problem. True False
9. Hormone production is not affected by the amount of sleep a person gets. True False
10. Using a computer and watching television should be avoided just before bedtime. True False

You must submit your completed test, with at least a score of 80%, and your completed course evaluation, to receive 1 hour of training credit for this course.

To submit via fax, please fax this page to 814-728-8887.

To submit via email, please send an email to training@northwesthc.org. Please put "Sleep Disorders Test" in the subject line, and the numbers 1—10, along with your answers, in the body of the email.

To submit via mail, please send to Northwest Health Connections, 247 Hospital Drive, Warren, PA 16365, ATTN: Lynn



NORTHWEST HEALTH CONNECTIONS
 A DIVISION OF MILESTONE CENTERS, INC.
EVALUATION OF TRAINING

Training Title: Sleep and Sleep Disorders
 Date: _____

Please check **ONE** box that best describes your role:

- Provider Direct Care Provider Admin/Supervisor
- Provider Program Specialist Provider Clinical Staff
- Consumer/Self-Advocate Family Member
- Supports Coordinator SC Supervisor
- PCH Staff/Admin FLP/LSP County MH/MR
- Other (please list): _____

Please tell us your **PRIMARY** reason for completing this home-study training:

- It's mandatory interested in the subject matter need training hours It was convenient

Please circle the best response to each question.

5=Strongly AGREE, 4=Agree, 3=Undecided, 2=Disagree, 1=Strongly DISAGREE

| | | | | | |
|-----------------------------------------------------------------|---|---|---|---|---|
| 1. As a result of this training, I have increased my knowledge. | 5 | 4 | 3 | 2 | 1 |
| 2. I learned something that I can use in my own situation. | 5 | 4 | 3 | 2 | 1 |
| 3. This training provided needed information. | 5 | 4 | 3 | 2 | 1 |
| 4. The training material was helpful and effective. | 5 | 4 | 3 | 2 | 1 |
| 5. Overall, I am satisfied with this training. | 5 | 4 | 3 | 2 | 1 |
| 6. I am glad I completed this training. | 5 | 4 | 3 | 2 | 1 |

Suggestions for improvement: _____

Additional aspects I feel should have been included in this training: _____

I would like to see these topics/conditions developed into home-study trainings: _____