

Sleep: Want It, Need It, Get It

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Fact Sheet

Sleep

Want It: Waking in the morning feeling refreshed, renewed and invigorated is a good indicator of an adequate quality and quantity of sleep. For some people, however, adequate sleep is seldom achieved.

Need It: Sleep is a fundamental component of good health across the lifespan. It is both restorative and protective. Individuals who do not have adequate sleep are more likely to experience attention and memory difficulties, daytime sleepiness, lack of energy, and are at higher risk of falling or having a traffic accident.

Inadequate sleep is associated with medical conditions, including heart and lung diseases, high blood pressure, depression, stroke, diabetes, and obesity. Not getting enough sleep can lower metabolic function, compromise immunity, be associated with cancer, increase sensitivity to pain and increase mortality.

Get It: Nonstop lifestyles, stress, lack of understanding about the health benefits of adequate sleep, and the presence of sleep-related problems are just a few of the reasons children and adults may fail to achieve adequate sleep.

Achieving adequate sleep may result from simple changes in routine, environment, diet and other factors. Sleep disorders are common, and some are serious, but most can be treated.

What is Sleep?

Sleep has distinct stages that cycle throughout the night in predictable patterns. The brain

stays active throughout sleep, and each stage of sleep is linked to a distinctive pattern of electrical activity known as brain waves. Feeling rested and being able to function well depends on total sleep time and on how much of the various stages of sleep a person gets each night.

Sleep is divided into two basic types: rapid eye movement (REM) sleep and non-REM sleep (with four different stages). Typically, sleep begins with non-REM sleep, progressing from stage 1 through stage 4. REM sleep begins about 90 minutes after a person falls asleep, and cycles along with non-REM stages throughout the night.

Stages 3 and 4 are considered deep sleep, during which it is very difficult to be awak-

Table 1

Non-REM Sleep

Stage 1: Light sleep; easily awakened; muscle activity; eye movements slow down.

Stage 2: Eye movements stop; slower brain waves, with occasional bursts of rapid brain waves.

Stage 3: Considered deep sleep; difficult to awaken; brain waves slow down more, but still have occasional rapid waves.

Stage 4: Considered deep sleep; difficult to awaken; extremely slow brain waves.

REM Sleep

Usually first occurs about 90 minutes after falling asleep; cycles along with the non-REM stages throughout the night. Eyes move rapidly, with eyelids closed. Breathing is more rapid, irregular, and shallow. Heart rate and blood pressure increase. Dreaming occurs. Arm and leg muscles are temporarily paralyzed.

ened. Deep sleep is considered the “restorative” part of sleep and is necessary for feeling well rested and energetic during the day.

Dreams occur during REM sleep. While dreaming, arm and leg muscles are temporarily paralyzed so the sleeper cannot act out dreams.

If REM sleep is disrupted during one night, it is typically longer than normal in subsequent nights until caught up.

Infants spend half or more of their total sleep time in REM sleep. As a person matures, the percentage of total sleep time spent in REM decreases to about one-fifth of sleep time.

It is known that REM sleep stimulates the brain regions used in learning and the formation of memories. Studies show, however, that other stages of sleep are also important for brain function.

Dreams: Why people dream is not well understood. Animal studies suggest that dreams may reflect the brain’s sorting and selectively storing important new information acquired while awake. During the time this information is processed, the brain might revisit scenes from the day while pulling up old memories. This may be why childhood memories mingle with more recent events during dreams.

How Much Sleep Is Enough?

Several factors determine how much sleep is enough.

Healthy adults, when given unlimited opportunity to sleep, will sleep on average between eight and eight and one-half hours. But normal sleep needs range from seven to nine hours.

Sleep needs also change throughout the lifecycle. Table 2 illustrates the amount of sleep a person generally needs to function well during the day.

As people get older, the pattern of sleep also changes. For example, children spend more time in the deep sleep stages than do adults.

Table 2

Life Stage and Sleep	
Life Stage	Average number of hours of sleep needed
Infants	16-18
Babies and Toddlers	12-14
Preschoolers	10-12
Elementary School Age	minimum 9
Teenagers	minimum 9
Adults	7-9

Hormonal influences shift adolescents’ biological clock. Teenagers are more likely to go to bed later than younger children and adults, and to sleep later in the morning.

From midlife through late life, people’s sleep is more interrupted by wakefulness during the night. These interruptions decrease both the quantity and quality of sleep in adults. Many older people complain of difficulty falling asleep, early morning awakenings, frequent and long awakenings during the night, daytime sleepiness, and lack of refreshing sleep. Sleep problems may be related to lifestyle or may result from medical problems or the medications or treatments of those medical problems.

Some evidence suggests that the biological clock shifts in older people, toward going to sleep earlier at night and waking up earlier in the morning. This does not mean older people can get by with less sleep than younger people.

Brain disorders such as Alzheimer’s disease may also disrupt the body’s biological clock.

Quality vs Quantity: Both are important. People whose sleep is frequently interrupted or cut short may not get enough of both non-REM sleep and REM sleep. Both types of sleep appear to be crucial for learning and memory – and perhaps for the other restorative benefits of healthy sleep, including cell growth and repair.

Just one night of inadequate sleep can ad-

versely affect a person's functioning and mood during at least the next day. Trying to make up lost sleep on a weekend does not completely erase a person's sleep deficit.

What Makes A Person Sleep?

The daily need for sleep may be driven, at least in part, by a naturally occurring compound called adenosine. It builds up in the blood while a person is awake. When a person sleeps, the body breaks down the adenosine. This molecule may help the body keep track of lost sleep and trigger sleep when needed. Because of such molecular feedback, a person cannot adapt to getting less sleep than the body requires.

Another sleep trigger is a person's "biological clock" – that is, the bundle of cells in the brain that respond to light signals received through the eyes. Darkness signals the biological clock to trigger the production of the hormone melatonin. This hormone increases through the night, making a person feel drowsy, with the greatest effect between midnight and 7 a.m. A second, milder, low may be in midafternoon, coinciding with another rise in melatonin.

The Sleep-Health Connection

Brain at work: During sleep, the brain is at work forming pathways necessary for learning, creating memories, and new insights. It is thought that sleep has an adaptive function that helps a person consolidate and fix memories and advance learning.

Inadequate sleep reduces a person's ability to perform, think, concentrate, learn and react. It increases anxiety, confusion, irritability and depression. Simple tasks can become difficult. An increased number of mistakes are made, including misjudgments while driving.

Creative insights often occur during sleep. Creative problem-solving, artistic and scien-

tific innovations have been associated with adequate sleep.

Memory: Sleep deprivation may interfere with short-term, or working, memory which is involved in temporarily storing and managing information. Sleep appears necessary for the acquisition of procedural memories, that is, memory of skills and procedures.

Mood: Adequate sleep promotes optimal brain performance for emotion control, decision-making and social interactions. Studies consistently show that lack of sleep increases irritability, volatility, and depression.

Immune system: The immune system's production of cellular hormones called cytokines also influences a person's need for sleep. Cytokines are compounds made in large quantities in response to certain infectious diseases or chronic inflammation and may prompt a person to sleep more than usual. The extra sleep may help conserve the resources needed to fight the infection. Recent studies confirm that being well rested improves the body's response to infection.

Obesity: Sleep deprivation alters hormones involved in appetite control and metabolism. Inadequate sleep has been shown to drive down leptin levels, which regulate the feeling of satisfaction after eating, and increases the hormone ghrelin, which stimulates appetite. The result of leptin decrease and ghrelin increase can be a nearly insatiable appetite, with a desire for high-carbohydrate, calorie-dense foods. A good night's sleep may be as essential to disease prevention and healthy weight maintenance as a nutritious diet.

Digestive problems: Inadequate sleep can cause problems such as constipation, diarrhea, excessive gas, abdominal pain, and heartburn.

Heart, blood pressure, and stroke: Sleep gives the heart and vascular system a much needed rest. If adequate rest is not achieved,

it might inhibit a dip in blood pressure that is important for good cardiovascular health. If blood pressure does not drop, a person is more likely to experience strokes, chest pain known as angina, an irregular heartbeat, heart attacks, and to develop congestive heart failure (fluid buildup in the body because the heart is not pumping sufficiently).

A lack of sleep puts the body under stress and may trigger the release of more adrenaline, cortisol, and other stress hormones during the day. These hormones contribute to blood pressure not dipping during sleep, thereby increasing the risk for heart disease. Inadequate sleep may also negatively affect the heart and vascular system by the increased production of proteins thought to play a role in heart disease. Some studies find that people who chronically do not get enough sleep have higher blood levels of C-reactive protein, which has been associated with a greater risk of developing hardening of the arteries (atherosclerosis).

Hormones: Deep sleep triggers more release of growth hormone, which fuels growth in children and boosts muscle mass and the repair of cells and tissues in children and adults. Sleep's affect on the release of sex hormones also relates to puberty and fertility.

Diabetes: A distinct rise and fall of blood sugar levels during sleep appears to be linked to sleep stage. Not getting enough sleep, or enough of each sleep stage disrupts this pattern.

Cancer, lung diseases, sensitivity to pain, and increased mortality are other sleep-health connections under study.

Microsleep, or very brief episodes of sleep in an otherwise awake person, can result from sleep deprivation. Microsleep that occurs while driving or working around machinery increases the risk of accidents.

Common Signs of a Sleep Disorder

Following is a list of common signs of a sleep disorder. Consult a doctor if you have any of them:

- It takes more than 30 minutes to fall asleep at night.
- You awaken frequently in the night and then have trouble falling back to sleep.
- You awaken too early in the morning.
- You frequently don't feel well rested despite spending 7-8 hours or more asleep.
- You feel sleepy during the day and fall asleep within 5 minutes if you have an opportunity to nap, or you fall asleep at inappropriate times during the day.
- Your bed partner claims you snore loudly, snort, gasp, or make choking sounds while you sleep. Or your partner notices your breathing stops for short periods. Such occurrences are symptoms of sleep apnea.
- You have creeping, tingling, or crawling feelings in your legs that are relieved by moving or massaging them, especially in the evening and when you try to fall asleep.
- While falling asleep or dozing, you have vivid, dreamlike experiences.
- You have episodes of sudden muscle weakness when you are angry, fearful, or when you laugh.
- You feel as though you cannot move when you first wake up.
- Your bed partner notes that your legs or arms jerk often during sleep.
- You regularly need to use stimulants to stay awake during the day.

Note: Although children can show some of the same signs of a sleep disorder, they often do not show signs of excessive daytime sleepiness. Instead, they may seem overactive and have difficulty focusing and concentrating.

They also may not do their best in school. It is estimated that as many as 20 percent of children who have been diagnosed with attention deficit hyperactivity disorder (ADHD) actually have a sleep disorder.

Snoring: Snoring occurs when air flows past relaxed tissues in the throat, causing tissues to vibrate as you breathe, creating hoarse or harsh sounds. Factors leading to snoring include mouth anatomy, alcohol consumption, nasal problems, and sleep apnea. Snoring may indicate other health concerns such as obstructive sleep apnea, nasal obstruction or obesity.

Parasomnias: Parasomnias are disruptive sleep-related disorders that can occur during arousals from REM sleep or partial arousals from non-REM sleep. Parasomnias are characterized by undesirable physical or verbal behaviors, such as walking or talking during sleep. They occur in association with sleep, specific stages of sleep or sleep-wake transitions.

Other common roadblocks to sleep: A number of other conditions can compromise the ability of a person to get adequate sleep. These conditions include: depression or anxiety; need to urinate during the night (may be due to an enlarged prostate in men or from cystitis in women); side effect of medication; hormonal changes (menopause); gastroesophageal reflux disease (or GERD); snoring partner; restless leg syndrome; inability to get comfortable because of pain; nighttime asthma; clenching or grinding of teeth (bruxism).

Tips for Getting a Good Night's Sleep

Stick to a sleep schedule. Go to bed and wake up at the same time each day. Sleeping late on weekends won't fully make up for the lack of sleep during the week and will make it harder to awaken on Monday morning.

Exercise, but not too late in the day. Try to exercise at least 30 minutes on most days but

not later than 5 or 6 hours before bedtime.

Avoid caffeine and nicotine. Coffee, colas, certain teas, and chocolate contain the stimulant caffeine, and its effects can take as long as 8 hours to wear off fully. Late afternoon or evening intake of caffeine can make it hard to fall asleep at night and increase the need to void during the night. Nicotine is also a stimulant, often causing smokers to sleep lightly. Smokers often wake up too early in the morning because of nicotine withdrawal.

Avoid alcoholic drinks before bed. Alcohol robs a person of deep sleep and REM sleep, so sleep consists only of the lighter stages. Also, after consuming alcohol a person tends to wake up in the middle of the night when the effects of the alcohol have worn off. Alcohol increases the need to void during the night.

Avoid large meals and beverages late at night. A light snack is fine, but a large meal can cause indigestion that interferes with sleep. Drinking too many fluids at night can cause frequent awakenings to urinate. A cup of warm milk may shorten the time it takes to fall asleep.

If possible, avoid medicines that delay or disrupt your sleep. Some commonly prescribed heart, blood pressure, or asthma medications – as well as some over-the-counter medications and herbal remedies for coughs, colds, or allergies – can disrupt sleep patterns. Trouble sleeping should be discussed with a doctor or pharmacist to see if any drugs that are being taken might be contributing to insomnia. Do not stop taking prescribed medications without consulting your doctor.

Don't take naps after 3 p.m. Naps do not substitute for a good night's sleep, but they can be restorative and help counter some of the impaired performance that results from not getting enough sleep at night. Naps can help you learn how to do certain tasks quicker.

Avoid taking naps later than 3 p.m., as late naps can interfere with falling asleep at night. Limit naps to one hour. Longer naps will make it harder to wake up and get back in the swing of things. Someone who takes frequent naps during the day might have a sleep disorder.

Take a hot bath before bed. The drop in body temperature after getting out of the bath contributes to feeling sleepy. Also, the bath can help a person relax, slow down and become more ready to sleep.

Have a good sleeping environment. Eliminate noise, light or anything that might distract from sleep. Keep the room cool and have a comfortable mattress and pillow. A television or computer in the bedroom can be a distraction, so move them to another room. Use the bedroom only for bedroom purposes.

Have the right sunlight exposure. Daylight is key to regulating daily sleep patterns. Try to get outside in natural sunlight for at least 30 minutes each day. If possible, wake up with the sun or use bright lights in the morning. Sleep experts recommend an hour of exposure to morning sunlight to help attune the biological clock to the difference between night and day.

Don't lie in bed awake. If still awake after lying in bed for more than 20 minutes, get up and do some relaxing activity until sleepy. The anxiety of not being able to fall asleep can make it harder to fall asleep.

Relax. De-stress the mind and body by visualizing details of a relaxing scenario, or progressively tighten and relax your muscles from head to toe. Mentally “park” your worries outside the sleeping environment. Make lists of tasks to be done the next day before going to bed to lessen the fear of forgetting something important. De-stressing rituals, such as meditation, can be useful.

See a doctor if sleep problems persist. A person who is consistently tired or not well rested during the day, despite spending enough time in bed at night, might have a sleep disorder. A family doctor or sleep specialist can help.

Sleep Centers and Sleep Medicine Specialists

If your doctor refers you to a sleep center or sleep specialist, make sure that center or specialist is qualified to diagnose and treat sleep problems. To find sleep centers accredited by the American Academy of Sleep Medicine, go to www.aasmnet.org and click on “Find a Sleep Center,” or call 708-492-0930. To find sleep specialists certified by the American Board of Sleep Medicine, go to www.absm.org and click on “Diplomates of the ABSM.”

Sleep Medications

Use of sleep medications does not address the sleep problem. Medications can create dependency and intensify problems if abused, misused, or taken too often. Read warning labels on all sleep medications. They should not be taken unless discussed first with your medical professional.

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References and Resources

American Academy of Sleep Medicine
One Westbrook Corporate Center, Suite 920
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708-492-0930
www.aasmnet.org

American Insomnia Association
www.americaninsomniaassociation.org

American Sleep Apnea Association
www.sleepapnea.org

Narcolepsy Network, Inc.
www.narcolepsynetwork.org

National Heart, Lung, and Blood Institute (NHLBI)
*www.ninds.nih.gov/disorders/restless_legs/
detail_restless_legs.htm*

National Heart, Lung, and Blood Institute (NHLBI)
Information Center – Your Guide to Healthy Sleep
P.O. Box 30105
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www.sleepfoundation.org

Restless Legs Syndrome Foundation
www.rls.org

SLEEPLESS IN AMERICA

Is Your Child Misbehaving or Missing Sleep?, Mary Sheedy
Kurcinka, HarperCollinsPublishers, 2006

Whose kids? Our kids! Teens and Sleep, B3706-13,,
AJ Schwichtenberg and Stephen Small,
University of Wisconsin

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