


Healthy sleep: Recharging your batteries

Sleep is a universal phenomenon. Every living thing must rest, whether it's the bear hibernating all winter or the deer sleeping only two hours at a time. Even unborn babies sleep—about 16 hours a day in the womb. Some scientists believe sleep is a time for the body to repair and balance itself—yet the body also does this while awake.

Sleep is in many ways a mystery. It's like a balanced diet: It occurs in different stages and proportions. It is not just simple "rest." During deep sleep, the body releases most of its growth hormone. Studies show that children with sleep apnea not only sleep poorly, they release less growth hormone and are shorter than their peers. And growth hormone doesn't just make you taller; it's a potent stimulator of the immune system. 

A dry medical definition of sleep might be as follows: unconsciousness from which a person can be aroused, as contrasted to coma, from which a person cannot be awakened. But what happens when we lie in bed unconscious? Are we just passive, dead to the world, stretched out flat for eight hours?

Not at all. Sleep is actually a highly active state. Until the 1930s, most scientists believed sleep was passive and that in sleep people simply shut down and stopped responding to their senses. Now it appears that sleep is a biochemical web of enormous complexity. The brain must send out chemicals to silence parts of itself and the body. It's as if the brain is in a constant tug of war between a chemical web that keeps it awake and one that keeps it asleep. Cutting a specific part of the brain stem, in fact, leads to a brain that never goes to sleep. Centers deep within the brain stem actively inhibit other parts of the brain and allow sleep to occur.

Older people are told that they simply need less sleep. Unfortunately, the truth is that the quality of sleep tends to ebb with age. Sleep changes with age, and the fact that older people have trouble sleeping could actually be part of the degenerative process of aging. The systems that are actively responsible for arousal and inhibition lose a little of their juice. A 30-year-old gets only about half as much deep sleep as a 20-year-old. By age 85, the average person spends about 20 percent of the night awake—though a contributing cause may be that the inactive elderly check in for more sleep than they actually need. And sleep may be more elusive for older people because of the "common" aches and pains associated with aging, as well as emphysema and other respiratory difficulties. Men, additionally, cope with benign prostate enlargement, which causes them to wake and urinate during the night. One study found that 50 percent of healthy people older than age 70 have sleep irregularities.

We now know that there are two types of sleep and that during the night these two types alternate with each other. The first is called slow-wave sleep—the deep, restful type of sleep that a person experiences during the first hour of sleep. Though we think of this sleep as the "deep, dreamless" kind, dreams and even nightmares can occur during this sleep. A second type of sleep, called REM (named after the rapid eye movements that occur during this process), happens every hour and a half, and lasts for five to thirty minutes. The dreams that we remember usually occur during REM sleep.

EEG studies of the brain during REM sleep are remarkably similar to waking patterns. That is why REM is sometimes called paradoxical sleep. It seems to be a paradox that a person can be asleep while the brain is highly active. Here are the important

hallmarks of sleep:

1. Active dreaming—which we may remember—usually occurs during REM.
2. During most REM sleep, a person usually is difficult to arouse. And yet in the morning, when a person awakens, it is often from REM sleep.
3. Muscle tone in the body is deeply relaxed, because of strong inhibiting signals from the brain.
4. Heart rate and breathing become irregular.
5. Eyes move rapidly, and muscles in the middle ear move.
6. The brain is highly active, and the metabolism of the brain may increase by as much as 20 percent over the normal waking state.

Brain Waves

Whether waking or sleeping, we tend to produce four types of brain waves—and at different times, different brain waves are dominant. They are as follows:

Beta waves: Waves of alert attention that occur between 14 and 50 cycles per second. In beta activity, billions of neurons are engaged in frenetic firing of impulses.

Alpha waves: Waves of relaxation, found in normal adults when they are in a quiet, resting state or meditating, that occur between eight and 13 cycles per second.

Theta waves: Waves of light sleep or drowsiness, which occur between four and seven cycles a second.

Delta waves: Slow, spindly waves of deep sleep, which occur as slowly as one cycle every third second. This is when heart rate and blood pressure fall and brain temperature actually cools down. Only very adept yogis can generate these waves at will.

Does the brain actually manufacture a “fatigue” chemical? One study of animals kept awake for several days found that their spinal fluid contained high levels of a special peptide protein. When this protein was injected into the brain of other animals, it caused them to fall asleep almost instantly and stay asleep for several hours. Unfortunately, taking it orally proved ineffective.

Even if we are beginning to understand how we fall asleep, nobody yet knows why we sleep—and why we experience REM sleep. We do know that during REM sleep, signals deep in the brain that would normally cause thought, motion and activity do not occur. The body and brain are inhibited by sleep, and the overall metabolic rate falls by up to 30 percent. It seems that our body is constantly in a cycle between arousal and rest and that this basic rhythm of existence is reflected in our waking and sleeping. If we stay awake too long, the mind and nervous system begin to malfunction. People can become irritable or even psychotic after being awake for too long.

Skilled meditators know how to replicate the rare patterns of brain waves that occur only in deepest sleep. That rich reservoir of brain rest allows them to do with less sleep and yet to stay biologically “young.” During sleep the sympathetic nervous system—the fight-or-flight system—relaxes, and blood pressure falls, muscles relax and skin vessels dilate, warming the body. The parasympathetic nervous system is more active. This may be why many asthma attacks occur during sleep, when the

parasympathetic system causes bronchial tubes to constrict. Asthma sprays can then provide a sympathetic “kick.”

The big question everybody asks about sleep usually takes the form of a complaint and it goes something like this: “How come some people can get by on five hours of sleep a night and I need eight?” Why did Albert Einstein confess to needing 10, while Edison relied on short catnaps?

Studies of twins indicate an answer most people don’t want to hear: It may be your genetic predisposition. Twins seem to need the same amount of sleep. And though you may get more sleep one night and less the next, your average sleeping time usually remains constant throughout life, except, sometimes, when you are older. Sleeping less is not a behavior that you can learn, and those of us who sleep less than we should are probably impaired at certain tasks during the day.

So, you may wonder, how much should you sleep? Only your body knows the answer: Sleep until you feel refreshed. There are a few lucky individuals who are born to be short sleepers. On only two or three hours a night they feel refreshed and energetic. When forced to sleep four hours a night, they feel groggy and irritable.

Insomnia, then, can be defined as the individual’s perception of insufficient sleep—sleep that does not leave him feeling restored. Sleeping three hours a night does not define insomnia, if the person in question feels alert and refreshed during the day. Insomnia usually takes the form of:

- difficulty falling asleep (or what researchers call sleep onset difficulty)
- difficulty remaining asleep (sleep maintenance difficulty)
- sleep that doesn’t restore (for instance, sleep apnea).

Insomnia can be transient (a few days), short term (a few weeks) or chronic (a few months or longer). It can have many causes and just as many solutions.

Do you have a sleep disorder?

Ask yourself the following questions to determine the possible cause of sleep difficulties.

1. How long have you had trouble sleeping? If only a few days, or even a few weeks, you have a short-term problem. If your sleeplessness has lasted months, your problem is chronic. Short-term problems usually are easier to treat.
2. Does it take you a long time to fall asleep at night? If so, you have a sleep-onset problem. This often can be caused by substances such as caffeine and nicotine.
3. Once you fall asleep at night, do you sleep well through the night? If not, you have a sleep maintenance problem. This can be caused by alcohol, depression, hypoglycemia or disturbances in your environment.
4. Does your sleep problem cause you anxiety? Could part of the cause of your insomnia be your anxiety? This is known as a psychophysiological sleep disorder. It’s as real as any insomnia, but it can be treated through behavioral changes and sleep hygiene solutions.
5. Are you anxious about many things in your life? Do you feel edgy and nervous all day? Your insomnia may be one manifestation of major anxiety or depression. If so,

you may need to seek therapy or even short-term antidepressant therapy.

6. What time do you go to bed? You may be going to bed at a time that doesn't suit your body clock. If so, you could be suffering from a sleep-clock problem. This can be adjusted by changing bedtime hours or by using the same type of light therapy used in certain forms of seasonal depression.

7. What time do you wake up? Perhaps your sleep-clock problem causes you to wake early and feel tired before bedtime. This also can be treated by the same methods mentioned above.

8. Do you sleep late on the weekends? You may be throwing off your sleep clock, causing yourself occasional insomnia.

9. Do you have a changing work shift? Do you work at night? Do you travel across time zones frequently? The body has trouble changing its internal rhythms, hormones and chemicals when you constantly change your time clock. As a result, you may suffer from sleeplessness.

10. Do you take many naps? These could be causing you to stay awake at night.

11. Do you feel refreshed during the day, in spite of lack of sleep? If you feel refreshed, you may simply need very little sleep.

12. Are you feeling sad, blue, down in the dumps? Many depressed individuals attribute these feelings to poor sleep when in fact it's depression that disrupts sleep patterns. The underlying depression must be treated.

13. Does your spouse complain about your snoring? You could have sleep apnea, which causes light, disturbed sleeping patterns that result in constant fatigue.

14. Do you have an achy body? Some light sleepers suffer from an achy body syndrome called fibromyalgia.

The quiz should help you to determine the nature of your insomnia. If it is short-term, take a calming bath or sleep-inducing herbs like valerian, hops and passionflower. Drink milk just before bedtime. Don't worry about lack of sleep.

If insomnia is chronic, determine possible causes. We'll discuss causes and suggest solutions next month.