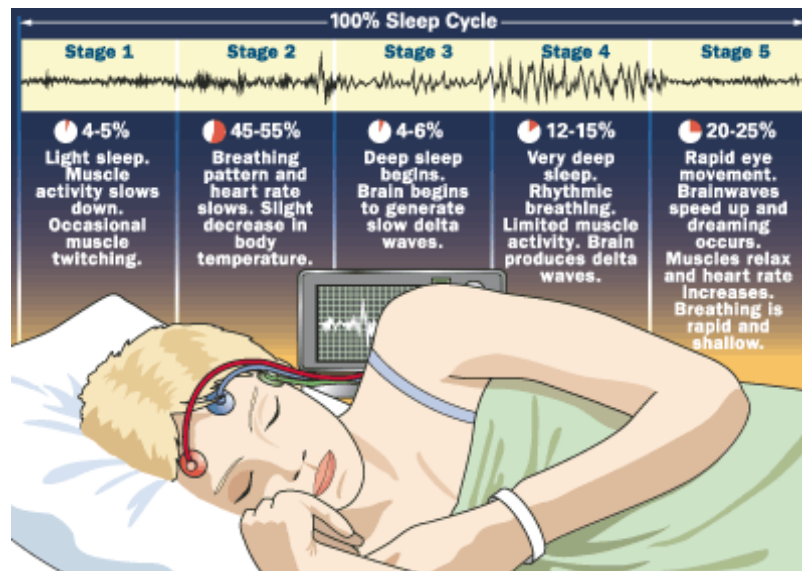


Sleep

Sleep and the Brain

If you attach an **electroencephalograph** to a person's head, you can record the person's brainwave activity. An awake and relaxed person generates **alpha waves**, which are consistent oscillations at about 10 cycles per second. An alert person generates **beta waves**, which are about twice as fast.

During sleep, two slower patterns called **theta waves** and **delta waves** take over. Theta waves have oscillations in the range of 3.5 to 7 cycles per second, and delta waves have oscillations of less than 3.5 cycles per second. As a person falls asleep and sleep deepens, the brainwave patterns slow down. The slower the brainwave patterns, the deeper the sleep -- a person deep in delta wave sleep is hardest to wake up.



Sleep stages

At several points during the night, something unexpected happens -- **rapid eye movement** (REM) sleep occurs. Most people experience three to five intervals of REM sleep per night, and brainwaves during this period speed up to awake levels. If you ever watch a person or a dog experiencing REM sleep, you will see their eyes flickering back and forth rapidly. In many dogs and some people, arms, legs and facial muscles will twitch during REM sleep. Periods of sleep other than REM sleep are known as NREM (non-REM) sleep.

REM sleep is when you **dream**. If you wake up a person during REM sleep, the person can vividly recall dreams. If you wake up a person during NREM sleep, generally the person will not be dreaming.

You must have both REM and NREM sleep to get a good night's sleep. A normal person will spend about 25 percent of the night in REM sleep, and the rest in NREM. A REM session -- a dream -- lasts five to 30 minutes.

Medicine can hamper your ability to get a good night's sleep. Many medicines, including most sleeping medicines, change the quality of sleep and the REM component of it.

Missing out on a good night's sleep can seriously affect what happens when you're awake. We'll look at what happens next.

Missing Sleep

One way to understand why we sleep is to look at what happens when we don't get enough:

- As you know if you have ever pulled an all-nighter, missing one night of sleep is not fatal. A person will generally be irritable during the next day and will either slow down (become tired easily) or will be totally wired because of adrenalin.
- If a person misses two nights of sleep, it gets worse. Concentration is difficult, and attention span falls by the wayside. Mistakes increase.
- After three days, a person will start to hallucinate and clear thinking is impossible. With continued wakefulness a person can lose grasp of reality. Rats forced to stay awake continuously will eventually die, proving that sleep is essential.

A person who gets just a few hours of sleep per night can experience many of the same problems over time.

Two other things are known to happen during sleep. Growth hormone in children is secreted during sleep, and chemicals important to the immune system are secreted during sleep. You can become more prone to disease if you don't get enough sleep, and a child's growth can be stunted by sleep deprivation.

But the question remains -- why do we need to sleep? No one really knows, but there are all kinds of theories, including these:

- Sleep gives the body a chance to repair muscles and other tissues, replace aging or dead cells, etc.
- Sleep gives the brain a chance to organize and archive memories. Dreams are thought by some to be part of this process.
- Sleep lowers our energy consumption, so we need three meals a day rather than four or five. Since we can't do anything in the dark anyway, we might as well "turn off" and save the energy.
- According to ScienceNewsOnline: Napless cats awaken interest in adenosine, sleep may be a way of recharging the brain, using adenosine as a signal that the brain needs to rest: "Since adenosine secretion reflects brain cell activity, rising concentrations of this chemical may be how the organ gauges that it has been burning up its energy reserves and needs to shut down for a while." Adenosine levels in the brain rise during wakefulness and decline during sleep.

What we all know is that, with a good night's sleep, everything looks and feels better in the morning. Both the brain and the body are refreshed and ready for a new day.

Dreams are another important part of sleep. We'll take a closer look at how dreams work in the next section.