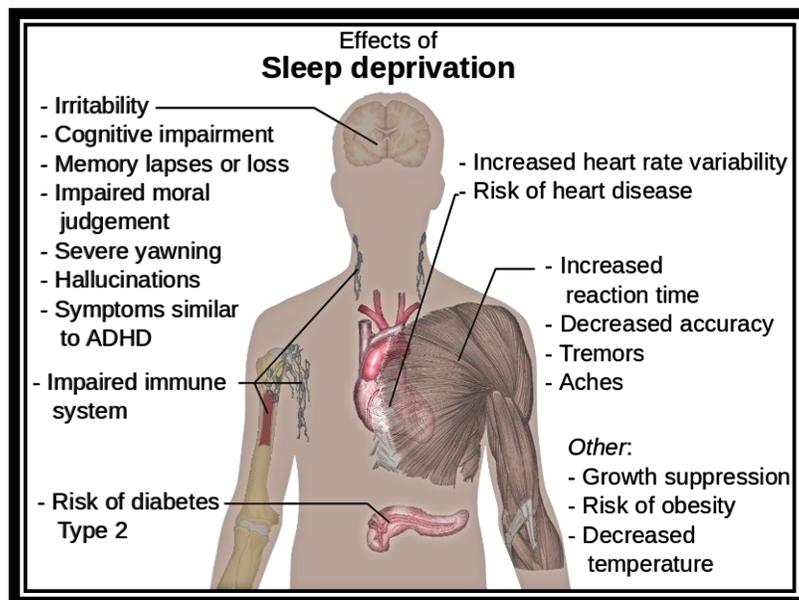


## Sleep

### Why is sleep important?

- **Sleep plays an important role in memory.** Studies have shown that sleep plays an important role in the consolidation of memories, particularly for recalling facts and figures, i.e. declarative memory. This type of memory is especially important for college students.
- **Insufficient sleep is linked to the development of chronic disease,** such as coronary heart disease and Type II diabetes. More specifically, quantity of sleep has been recently used as predictors for atherosclerosis and for Hemoglobin A1c, a clinical marker for blood sugar level.
- **Sleep promotes healthy weight maintenance.** Epidemiological studies demonstrate a correlation between sleep duration and body mass index. It is believed that sleep deprivation may negatively affect the function of the hypothalamus, the part of the brain that helps regulate appetite and hunger cues.



### Sleep deprivation is also associated with...

- Increased risk of motor vehicle accidents (related to impairment in reaction time and judgment)
- Increased risk for psychiatric conditions including depression and substance abuse
- Decreased ability to pay attention and process new information

### Do I have a “biological clock” for sleep?

Yes! The body’s “master clock” is actually a group of about 20,000 nerve cells in the brain called the suprachiasmatic nucleus, or SCN. The SCN is located in the hypothalamus and helps regulate many systems, including circadian rhythms. SCN largely regulates sleep via the production of melatonin, a hormone that makes you sleepy. The SCN is located just above the optic nerves, so it readily receives information about light. When there is less light, i.e. at nighttime, the SCN tells the brain to make more melatonin so you become sleepier. The release of melatonin is just one component of an organism’s natural circadian rhythms.

**Circadian rhythms** are physical, mental and behavioral changes that follow a roughly 24-hour cycle, responding primarily to light and darkness in an organism’s environment. They are found in most living things, including animals, plants and many tiny microbes. There is an entire field of science dedicated to the studying circadian rhythms known as *chronobiology*.

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**But why do humans and animals need sleep?** Many studies have shown that sleep is essential for survival for all animals. For example, rats deprived of sleep can only survive for two-three weeks. Studies involving human subjects show that severe sleep deprivation can lead to extreme paranoia and cause hallucinations. But still, scientists do not fully understand the function of sleep. There are several leading hypotheses. For example:

- **Energy conservation.** This theory is based on the fact that the metabolic rate is lower during sleep and predicts that total sleep time is proportional to the amount of energy expended during wakefulness.
- **Memory consolidation.** Studies have long shown that sleep promotes learning and memory. During the day we are inundated with experiences: some should be remembered while others need not be. Certain theories suggest that sleep helps us rearrange experiences and thoughts from the day so that those that are important are stored and those that are not are discarded.
- **Protection from predators.** Historically, animal and human inactivity during sleep would minimize the risk of exposure to predators.
- **Brain development.** This concept relates specifically to REM sleep, which occurs for prolonged periods in fetal and infant development, suggesting that sleep may be critical to the formation of brain synapses.

**How many hours of sleep do I really need each night?** This is tricky question because the number varies from person-to-person. On average, most adults need 7-9 hours of sleep each night to meet their *basal sleep needs*. This refers to the amount of sleep our bodies need on a regular basis for optimal performance. However, researchers have found that most American's tend to accumulate *sleep debt*, which can complicate the effects of sleep. Quality of sleep is also important. For example, many people sleep nine hours a night but still will not feel well rested when they wake up because the quality of their sleep is poor.

**What if I feel fine with getting just 6 (or fewer) hours of sleep?** It is important to first note that there is a big difference between the amount of sleep someone can "get by on" and the amount needed to function optimally. Individuals who get enough sleep feel well-rested and energetic throughout the entire day. Most people need 7-8 hours to feel this way. However, researchers at the University of California, San Francisco discovered that some people actually have a mutation in a gene called DEC2, which enables them to do well on six hours of sleep a night. However, this mutation is very rare and is present in less than 3% of the population. This means the other 97% of should still try to sleep for 8 hours each night.

### 10 Tips to Help You Get More Sleep

1. Maintain a regular bedtime and wake time schedule including weekends.
2. Establish a regular, relaxing bedtime routine such as take a hot bath or shower and then reading a book or listening to soothing music.
3. Create a sleep-conducive environment that is dark, quiet, comfortable and cool.
4. Cover or turn off items (such as phones, computers) that may disrupt sleep.
5. Use your bed (and bedroom) only for sleep whenever possible.
6. Finish eating at least 2-3 hours before your regular bedtime.
7. Exercise regularly.
8. Avoid caffeine (e.g. coffee, tea, soft drinks, chocolate) and other stimulants (e.g. nicotine)... especially close to bedtime.
9. Avoid alcohol close to bedtime as alcohol disrupts normal sleep patterns by decreasing the amount of time people spend in REM sleep, which is necessary for memory, concentration and motor skills.
10. Practice relaxation techniques throughout the day. This has been shown to help individuals fall asleep more quickly.

Potkin KT, Bunney WE Jr (2012) Sleep Improves Memory: The Effect of Sleep on Long Term Memory in Early Adolescence. PLoS ONE 7(8): e42191. doi:10.1371/journal.pone.0042191

NIH(2012) Information About Sleep. Sleep, Sleep disorders, and biological rhythms. National Institutes of health. Retrieved from: <http://science.education.nih.gov/supplements/nih3/sleep/guide/info-sleep.htm>

How much sleep do you need? Helpguide.org. Retrieved from: <http://www.helpguide.org/life/sleeping.htm>