

Sleep - Who Needs It Anyway?

To answer the above question, we first need to define what sleep is and what are its characteristics. We'll then review sleep's functions and try to assess its importance and contribution to the active player. Sleep is a state characterized by activity and response to stimuli at an intensity lower than the response intensity during wakefulness (Wikipedia). Sleep is commonly described as a state of moderate wakefulness with closed eyes.

Sleep takes up nearly a third of the average person's life, yet relatively little is known about it.

Sleep States - Sleep is characterized by five stages: the first four are very different from the fifth. The first sleep state is characterized by alpha brain waves at a frequency of 8-13 Hz, gradually slowing to 8-10 Hz. Heart rate decreases and muscles relax. Within minutes, theta waves with a frequency of 4-7 Hz begin to integrate with the alpha waves. This isn't real sleep, although dream-like hallucinations called "hypnagogic hallucinations" appear. The second sleep state is characterized by the disappearance of alpha waves and the appearance of K-complexes and sleep spindles. In the third stage, very slow brain waves integrate with theta waves. These are delta waves with a frequency of 1-4 Hz.

The fourth stage is characterized by delta waves only. These waves are very slow but have high amplitude, meaning high electrical voltage. Usually after the fourth stage of sleep, brain waves return and become faster waves, theta waves characterizing the second sleep stage, and then the fifth sleep state appears, REM (Rapid Eye Movements) sleep, which is completely different. During REM sleep, there is a significant decrease in sensitivity to various stimuli (noise, temperature, etc.), but paradoxically, stimuli of a personal nature (such as hearing the sleeper's name) may cause immediate awakening.

To summarize the numerical value of frequency in different stages. In the waking state, waves range between 8-25 Hz.

1. *In sleep stage 1* - alpha waves at lower frequency and growing waves, therefore ranging between 6-8 Hz.
2. *In sleep stage 2* - there's a decrease in frequency 4-7 and spindles are seen, plus K-complexes which are like wider amplitudes that flow into stages 3 and 4.
3. *Stage 3 or 4* - Higher amplitude in stage 3 with frequency 1-3 Hz and in 4 - already at frequency less than 2 Hz.
4. *In dream stage*, frequency rises to more than 10 Hz as in waking state.

Sleep Cycles - Each sleep cycle, including all stages, lasts between an hour and a half to an hour and fifty minutes. The internal distribution between stages varies. At the end of the night, REM state extends longer, while deep sleep stages (stages 3-4) that are not Non-sleep REM (NREM) become shorter. On average, REM time is one-fifth of total sleep time, but this ratio changes with age. In children, REM lasts longer, but its characteristics differ from those of adult REM sleep.

Optimal sleep duration varies from person to person. According to experts, the average sleep duration required for an adult is about seven and a half hours. It has been found that with increasing age, sleep becomes shorter and is accompanied by many periods of wakefulness. Under modern life pressures, the average sleep rate is less than recommended, and a connection has been found between lower life expectancy and lack of sleep. However, especially long sleep is not necessarily beneficial for longevity.

Sleep has several vital functions:

Sleep aids in the secretion of essential substances. Many studies conducted in humans and animals have shown that damage to this stage of sleep detracts greatly from the ability to remember details or tasks learned before sleep. The human body also needs several substances that are secreted mainly or only at night, such as growth hormone, which is secreted during deep sleep stages at the beginning of the night, and cortisol, a natural steroid, which is secreted mainly in the final sleep stages, and this is apparently among the reasons why lack of sleep particularly affects the immune system.

Resetting Stimulus Thresholds - Some of the neural mediators associated with alert thinking decrease in concentration during sleep, so that the stimulus threshold of neurons in the brain can be reset to normal levels. This is thought to be the source of the irritability characteristic of sleep deprivation and the alertness and mental clarity characteristic of people who have just awakened.

Sleep conserves energy - During deep sleep stages (but not during REM sleep), the body consumes much less energy. Because of this, small animals, which have particularly high metabolic activity in their bodies, need more sleep than humans do.

Renewal of Neural Mediators - During sleep, free radicals that accumulate in the brain are cleaned by appropriate enzymes, and even the enzymes themselves that were damaged during wakefulness are renewed. It has been found that extreme sleep deprivation can cause death, and it has been suggested that the accumulation of this cellular damage is the cause. Also, according to this theory, it was found that small animals with high metabolic rates need more sleep than their larger counterparts (pocket rodents sleep about 18 hours a day, compared to crocodiles that sleep about 2-6 hours).

Sleep helps learning - An interesting method of knowledge acquisition is playing an audio tape where study material is recited in the ears of a sleeping person. To the disappointment of students, and as many experiments have proven, this method doesn't work. However, there are claims that material reviewed before sleep will be better remembered. Generally, it is commonly assumed that there is some connection between REM sleep and learning. Brain scans conducted on sleeping animals strengthened this hypothesis. REM sleep extends in the days following intensive learning and its deprivation is expected to cause memory difficulties.

Psychological studies conducted on rats found that when rats were taught to navigate a maze, and then deprived of REM sleep, they showed poorer performance compared to rats who had regular night sleep. When this topic was researched in humans, similar results were found. People who couldn't get REM sleep showed poorer abilities in tasks learned the previous day. It is known, nevertheless, about people who maintained their cognitive abilities even in the absence of this type of sleep. The sages claimed that one who doesn't sleep loses their judgment and that sleep brings good judgment!

Brain Functions in Sleep - Wakefulness and sleep are related to the presence or absence of three neurotransmitters: serotonin, norepinephrine, and histamine. Their levels decrease with falling asleep and increase with awakening. Histamine is responsible for putting the body to sleep or arousing it, while the absence of the other two neurotransmitters causes muscle relaxation in REM sleep. People who suffer from insomnia suffer from excess histamine, while people who take anti-allergic antihistamine medications tend to drowsiness. In this context, we'll mention Shakespeare who said: "Sleep that knits up the raveled sleeve of care..."

Sleep and Physical Activity - Sleep has a crucial effect on physical functioning. Both people in general and players need rest and sleep. Regarding athletes, it's worth noting that physical fitness doesn't cause an extension of sleep duration, but it warms the body and therefore leads to an extension of the deep sleep period, which contributes to its cooling. Sports activity done during the day makes it easier to fall asleep quickly at night. An active player suffering from fatigue and irregular sleep will have difficulty making decisions during the game and their reactions will be slow and make it difficult to compete for the ball. Moreover, their physical fitness will not be expressed and they will display poor performance of simple and complex skills such as passing accuracy, dribbling ability, and ball movement. A player is required to demonstrate agility, speed, explosive power, and high mobility during 90 minutes of intensive play. When the player is tired, they don't have the ability, drive, and desire to "fight" for every ball, cooperate with their teammates, and certainly not to initiate attack moves.

One should prepare for sleep and enable optimal sleep according to the following recommendations: It is recommended to avoid coffee in the evening and throughout the day; remove the television from the bedroom; take a hot shower before sleep; create a dark sleep environment. To achieve optimal realization of physical and cognitive abilities before a game, one should ensure at least 7 hours of sleep, meaning no going out "celebrating" the evening before the game... Also, if necessary, it's advisable to replace your mattress every 10 years.

In conclusion, it can be determined that sleep is essential for proper human functioning in daily life and for the active player in particular. Sleep contributes to proper brain functions, judgment, mental clarity, and enables the performance of physical abilities and skills. **A tired player is an unfit player who harms their own ability and the abilities of the entire team!**