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INFORMATION TECHNOLOGY AND SLEEP-LEARNING

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The aim of this research is to prove that sleep is one of the most important parts of our life and to find out how to take advantage of it.

The tasks are to understand the basics of good sleep, why do people want to go to bed, to suggest what environment to choose and nutrition options and behavioral restrictions for better rest.

The object of research is sleep, its stages and circadian rhythms, the quality of sleep, bedroom environment, supplements and sleep learning in general.

Results and discussion. Sleep-learning is an attempt to convey information to a sleeping person, typically by playing a sound recording to them while they sleep. It is almost certainly a pseudoscience, as this particular kind of sleep learning is almost certainly impossible. Many studies have claimed that the technique is not effective, but some others claim to have found that the brain indeed reacts to stimuli and processes them while asleep, though these have been criticised for spurious methodology. In order to start practicing sleep learning, you should know the foundations of sleep. Sleep stages consist of orthodox sleep and REM sleep. These stages are cycled and have different impact on our relaxation. Circadian rhythms are biological processes linked to the cycles of the day. Many bodily functions vary according to these rhythms, including body temperature, pulse rate and blood pressure, reaction time and performance, the production of melatonin, serotonin and cortisol, intestinal activity. Orthodox sleep has several parts, namely:

W – Wakefulness (beta waves). Meditative state with one's eyes closed, along with increased production of serotonin. A number of proven health benefits have been observed while using techniques such as meditation to increase one's alpha and theta waves. **N1 – The first stage (theta waves, 4–8 Hz).** This is a transitory phase from wakefulness to light sleep. The sleeper changes position frequently, and is in a deep meditative state. However, if someone were to wake the person up, he or she might not feel like they had fallen asleep. Duration: about 10 minutes. **N2 – The second stage (sleep spindles, 11–16 Hz):** A period of light sleep, during which there is little movement and the breathing is quiet. The second stage involves periodic surges in brain wave frequency, the so-called sleep spindles. Brain activity during the second stage is more active than in the first stage. Dreaming becomes possible. Getting enough stage two sleep improves motor skills. The person can still be easily woken up during this stage. Duration: 20 to 30 minutes. **N3 – The third stage (delta waves, 0–8 Hz):** A period of deep sleep, where breathing is stable. Muscles are completely relaxed, and the pulse, body temperature and blood pressure have decreased. Production of human growth hormone begins, and the regenerative mechanisms of the body are activated. The sleeper will not wake up if another person walks into the room. Pulse, blood pressure and body temperature are at their lowest. Duration: 30 to 40 minutes. Elderly people experience a shorter duration, by as much as six minutes. **R – REM Sleep (alpha and beta waves):** During REM sleep, the brain is awake, but the rest of the body is asleep. The muscles in the neck and the body are paralysed to prevent sleepwalking. During REM, the eyes are moving under the eyelids, and dreaming is at its peak. The typical adult has an average of 4 to 5 REM stages every night. The first stage lasts about 10 minutes, while subsequent stages are often longer, around 30 minutes. REM sleep is important for the regeneration of the brain's nerve cells. Tests measuring the effects of sleep deprivation have shown that REM sleep is absolutely indispensable as deprivation leads to irritability, fatigue, memory loss and reduced capacity for concentration. One full REM cycle lasts about 90 minutes. From the perspective of getting a good night's sleep, it is paramount to maximise the amount of deep sleep (N3) by going through at least three cycles. Getting enough sleep reorganises one's memory and improves one's learning capacity. In the later cycles, the amount of REM increases and the amount of deep delta sleep decreases, until the latter disappears completely.

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and blood pressure, reaction time and performance. The production of melatonin, serotonin and cortisol, intestinal activity, light clearly has a central role in the regulation of our daily lives, and can be used to reset our circadian rhythms. In order to optimize sleep, it is important to understand how other hormones influence circadian rhythms. High levels of dopamine and serotonin have been linked to the feeling of alertness, and adversely low levels to sleepiness. Cortisol, known as “the stress hormone,” contributes to sudden wakefulness in the middle of the night. Its production is especially active for the first 30 minutes or so after waking up.

Setting up your bedroom. Lighting. Sunlight, moonlight and LEDs on electronics can disturb sleep. Instead, try: using blackout curtains, darkening the LEDs of your electronic devices with black adhesive tape, switching lamps to brands that do not emit the blue spectrum of light – special lamps that change the spectrum of light according to the cycle of the day – dim salt lamps.

Bed quality and ergonomics. Bed materials that do not breathe may induce allergies, and beds which are unergonomic may disturb your sleep. Instead, try: a mattress or futon made of organic cotton, wool, hemp or natural rubber (instead of being covered with potentially allergenic polyurethane foam and chemicals). Oat, cherry, spelt or buckwheat pillows. Choosing materials for your sheets and blankets that promote better thermoregulation (organic cotton, leather, silk, etc.).

Electromagnetic pollution. Some people may experience sensitivity to electromagnetic radiation. Dozens of studies have been conducted on electromagnetic hypersensitivity (EHS), but its existence has not been successfully verified. Some studies suggest that “grounding” can alleviate insomnia. Instead, try: placing WLAN routers and mobile phones at a distance, and switching mobile devices to flight mode.

Air quality. Research shows that poor indoor air quality affects respiratory organs and can thereby cause sleeping problems. Instead, try: ventilating the bedroom during the day. The use of house plants increases humidity, turns carbon dioxide into oxygen, and releases negative ions into the air (for example, golden cane palm, snake plant and devil’s ivy). Air filtering (UV, HEPA, carbon filtering, photocatalytic oxidation, air ionizer). Adjusting humidity with technical tools. Most people prefer 30–50% humidity.

Temperature. The temperature of the body drops during sleep. Sleeping in a room that is too hot, or too cold, makes it difficult to maintain optimal thermoregulation. Instead, try: adjusting radiators and air conditioning. Keep windows open and ventilating the space properly. The optimal temperature for most people is around 18–22 degrees Celsius.

Background sounds. To practice sleep learning, you must have an audio player, preferably stereo, because headphones can damage your ears. Set timeout for about 20 minutes for your sound system in order to not get disturbed while trying to fall asleep. Use low volume only.

Avoid substances that disturb your sleep. Avoid caffeine (coffee, tea, energy drinks, chocolate) 5–8 hours before going to bed. You can use 1000–2000 mg of vitamin C to make caffeine leave the body quicker. **Limit late-evening alcohol consumption** to two doses maximum. Alcohol reduces REM sleep. Enjoy your last glass of alcohol no later than 90 minutes before going to sleep. **Tyramine** increases the production of noradrenaline, which boosts brain activity and keeps you awake. The following food products contain tyramine, so they should be avoided at dinner: bacon, cheese, chocolate, eggplant, potato, sauerkraut, sausage, spinach, tomato and wine. Instead meditate, take care of blood sugar levels and plan your next day.

Conclusion. Sleep in one of the main parts of our lives, without good sleep we are doomed.

Keywords: sleep, insomnia, biohacking, life.

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