

Sleep

“Sleep is that golden chain that ties health and our bodies together.”

Thomas Dekker, English dramatist (1572-1632).

Without adequate sleep people become irritable, have lowered resistance to illness, are unable to sustain attention, ‘see things’, ‘hear things’, and become unproductive, unreasonable and short tempered. Good sleep is essential to feeling good and enjoying life.

Insomnia

Insomnia refers to a lessening of the duration or depth of sleep. It is defined by difficulty in getting to sleep, staying asleep, returning to sleep once disturbed and a feeling of being unrested in the morning. Insomnia can be classified into three categories. The imaginary insomniac complains that they ‘have not slept at all’ but when studied in a laboratory it is found that they do actually sleep. Although their sleep may be less than the average seven and a half to eight hours, they may take slightly longer to fall asleep and once asleep tend to wake up more often than is normal. Everyone can experience the second type of insomnia, situational insomnia. This occurs when we have difficulty sleeping prior to an exam, after the death of a loved one or when we are sleeping in an unfamiliar place. Pathological insomnia the third type of insomnia is commonly a sign of more serious psychological disturbances - such as depression which is a major enemy of sleep. It is long lasting and accompanied by emotional instability and loss of efficiency during the day.

There are many causes of insomnia including anxiety and depression, recurrent noise, physical discomfort such as toothache or inflammatory conditions,

threadworms, pregnancy, breathing difficulties as may occur with heart and chest diseases, sleep apnoea, snoring and drugs.

Stages of sleep

Sleep is divided into two distinct states known as non-rapid eye movement sleep (NREM), the first four stages of sleep and rapid eye movement sleep (REM). These two states occur in a roughly 90 minute cycle which is repeated 5 to 6 times a night.

Stage 1 Sleep

This is experienced as we fall asleep and is a transition stage between wake and sleep. It usually lasts between 1 and 10 minutes. This stage is dramatically increased in some insomnia and in disorders that produce frequent arousals such as sleep apnoea. The eyes are closed during Stage 1 sleep, but if woken, a person may feel as if he or she has not slept.

Stage 2 Sleep

This follows Stage 1 sleep and is the "baseline" of sleep. This stage is part of the 90 minute cycle and occupies approximately 45-60% of sleep. Stage 2 is a period of light sleep during which we have spontaneous periods of muscle tone mixed with periods of muscle relaxation. Muscle tone of this kind can be seen in other stages of sleep as a reaction to auditory stimuli. The heart rate slows, and body temperature decreases. At this point, the body prepares to enter deep sleep.

Stage 3 and 4 Sleep

These are deep sleep stages, with Stage 4 being more intense than Stage 3. These stages are known as slow-wave, or delta, sleep. This stage of sleep may last from 15-30 minutes in adults. It is delta sleep that is the "deepest" stage of sleep and the most restorative. It is delta sleep that a sleep-deprived person's brain craves the first and foremost. In children, delta sleep can occupy up to 40%

of all sleep time and this is what makes children unwakeable or "dead asleep" during most of the night.

Stage 5 REM (Rapid Eye Movement Sleep)

This is a very active stage of sleep. Composes 20-25 % of a normal nights sleep. Breathing, heart rate and brain wave activity quicken. Vivid dreams can occur. Sleep Specialists call this 5th stage of sleep "REM" rapid eye movement sleep because if one is to watch a person in this stage, their eyes are moving rapidly about. After REM stage, the body usually returns to Stage 2 sleep. Usually, REM sleep occurs 90 minutes after sleep onset. In normal sleep (in people without disorders of sleep-wake patterns or REM behavior disorder), heart rate and respiration speed up and become erratic, while the face, fingers, and legs may twitch. Intense dreaming occurs during REM sleep as a result of heightened cerebral activity, but paralysis occurs simultaneously in the major voluntary muscle groups, including the submental muscles (muscles of the chin and neck). Because REM is a mixture of excitement and muscular immobility, it is sometimes called paradoxical sleep. It is generally thought that REM-associated muscle paralysis is meant to keep the body from acting out the dreams that occur during this intense stage. The first period of REM typically lasts 10 minutes, with each recurring REM stage lengthening, and the final one lasting an hour.

During the first four stages of sleep our respiration and heart rate slow and the body is almost immobile. All of a sudden, after 20-30 minutes of slow wave sleep, we lighten into REM sleep when our respiration and heart rate increases substantially and we loose our ability to use our postural or skeletal muscles. Along with this, our brain becomes so activated that we start to hallucinate and have what we call dreams. Our eyes move down to midline, just as in wakefulness, and they begin to move sporadically, many times in relation to what we are dreaming. This paradoxical state will last 10-20 minutes and then we "fall" back down into Stage 2 again. This is the end of a sleep cycle and then it all starts over again, except we gradually loose our delta sleep and replace it with

longer and longer periods of alternating Stage 2 and REM sleep. By the final sleep cycle of the night, we will spend approximately half our time in Stage 2 and half in REM.

Factors that Affect Sleep Stage and the Sleep Cycle

Generally, sleep disorders affect the quality, length, and onset of sleep. Sleep deprivation, frequently changing sleep schedule, stress, and environment all affect the progression of the sleep cycle. Rapid eye movement latency (the time it takes a person to achieve REM sleep) may be affected by a sleep disorder like narcolepsy. Psychological conditions like depression shorten the duration of rapid eye movement. Also, treatment for psychiatric conditions often positively affects sleep, typically inducing some desired change in sleep habit. For example, antidepressants like Prozac® usually quicken sleep onset and lengthen REM stages. People who take antidepressants often benefit from the effects they have on the quality and duration of the sleep cycle. It has been reported that when couples sleep in the same bed their sleep stages are synchronized.

Age

The percentage of REM sleep is highest during infancy and early childhood, drops off during adolescence and young adulthood, and decreases further in older age. Of course, infants require the greatest amount of sleep. As parents know, total sleep time typically becomes shorter during childhood and may become longer again in adolescence. The amount of time we spend in each stage of sleep changes as we age. Stages 3 and 4 in the first sleep cycle shorten even more dramatically in older people than they do during a typical night for everyone else, so older people get less total deep sleep than younger people do. Also with age comes the lengthening of the first REM stage. Older people commonly enter REM sleep quicker and stay there

You may find it useful to link to these sites to read more about sleep:

www.sleepfoundation.org

www.sleepeducation.com

www.ilcusa.org

Publications consulted in the preparation of this information sheet

Aaronson S T, Rashed S, Biber M P & Hobson J A (1980). Sleeping together: a video tape look at a couples sleep. *Sleep Research* 9:120.

Akerstedt T, Hume K, Minors D & Waterhouse J (1994). The subjective meaning of good sleep, an intraindividual approach using the Karolinska sleep diary. *Perceptual and Motor Skill* 79:287-296.

Bader G G & Engdal S (2000). The influence of bed firmness on sleep quality. *Applied Ergonomics* 31:487-497.

Kryger MH, Roth T & Dement WC (1989). *Principles and practice of sleep medicine*. WB Saunders Company.

Oswald I (1970). *Sleep*, Penguin Books, London.

Oswald I & Adam K (1983). *Get a better nights sleep*, Prentice-Hall Canada Inc., Ontario.

Suckling EE, Koenig BF, Hoffman BF & Chandler McCB (1957). The physiological effect of sleeping on a hard or soft beds. *Human Biology* 29:274-288.

