

October 2004 lecture: Problems with Sleep

From notes by Louise Roe

What is Sleep?

Sleep is a physical and mental resting-place in which a person becomes relatively inactive and unaware of the environment. In essence, sleep is a partial detachment from the world, where most external stimuli are blocked from the senses. Normal sleep is characterised by a general decrease in body temperature, blood pressure, breathing rate and most other bodily functions. In contrast the human brain never decreases in activity. Studies have shown that the brain is as active during sleep as when awake. Throughout an eight-hour sleep cycle, a normal adult alternates between two very different states, non-REM and REM sleep.

What is a sleep cycle?

Sleep is a dynamic process consisting of two basic states: Rapid eye movement (REM) and non rapid eye movement (Non-REM). Non REM sleep is divided into four stages, numbered 1 through 4. (1 being the lightest drowsiness and 4 being the soundest) In all these non REM states the brain is relatively inactive and the body is relatively active (our muscle tone is maintained). We have an active body, inactive brain. In contrast, in REM sleep our brain is very active. This is the state in which we recall our most vivid dreams. In this state our body becomes limp and paralysed. During any given night of sleep we cycle back and forth repeatedly between these two types of sleep - usually four or five times a night. Usually people start with progressively deeper stages of non-REM sleep, and then have their first period of REM sleep only after some ninety minutes of non-REM sleep have occurred, after which they have more non-REM sleep, followed by yet another REM period. (4-5 cycles) Each successive REM period tend to be longer than the one that preceded it, so we get most of our REM sleep during the last part of the sleep. In contrast most of our deeper stages of non-REM sleep occur during the first third of the night.

What determines when we sleep?

A major reason why humans sleep is due to 1) Circadian rhythms also know as the biological clock. A cycle that lasts 24 hours is called a circadian. Some physiological functions that are circadian include body temperature (core temperature) and certain hormone secretions. Humans have a natural

cycle of approximately one day. 2) Light - easier to get up in summer. 3) Nonphotic cues/stimuli other than light and dark that alter or regulate the periodicity and the phases of the rhythm - food, exercise, social interaction and body temperature. 4) Age. Babies sleep a lot more than adults. They have about 50% dream sleep. This is why it is believed that whatever is going on in dreams helps develop the brain. With age deep sleep reduces. Dream sleep doesn't change much with age. Older people have more wakes and less sleep and more daytime naps.

How much sleep do we need?

Six to eight hours sleep is said to be the average amount of sleep a person needs. That's about one third of a lifetime. As a population we sleep about one hour less than we did 100 years ago. Sleep requirements vary from person to person; some people are naturally short or long sleepers. Some experts suggest that the best way to determine personal sleep requirements is by waking up without an alarm. A recent study showed that people who get 7 – 7 1/2 hours sleep live longer. Catherine suggests that an ideal amount of sleep is the amount needed to feel refreshed and well rested the next day.

Problem Sleepiness

Everyone feels sleepy at times. However, when sleepiness interferes with daily routine and activities, or reduces the ability to function, it is called “problem sleepiness” A person can be sleepy without recognising it. For example a person may not feel sleepy during activities such as talking and listening to music at a party, but the same person can fall asleep while driving home afterwards.

You may have problem sleepiness if you:

- . Consistently do not get enough sleep.
- . Fall asleep while driving.
- . Struggle to stay awake when inactive, such as when watching television or reading.
- . Have difficulty paying attention or concentrating at work.
- . Have performance problems at school or work.
- . Have difficulty controlling your emotions.
- . Have slowed responses and difficulty remembering things.
- . Must take naps on most days.

Sleepiness can be due to the body's natural daily sleep wake cycles, inadequate sleep, sleep disorders or certain drugs. Sleepiness can be physiological at certain times of the day, such as in the early afternoon. In the morning time people tend to be most alert in the morning time. Sleepiness is affected by age, with babies, teenagers and older people being sleepier than adults. There is an increase in sleepiness with sleep deprivation, shift workers and with jet lag.

Sleepy people tend to

Have a higher level of accidents

Have an impaired quality of life

Have impaired schoolwork

Have marital problems

Have memory and concentration difficulties

Suffer with depression

Sleep disorders such as sleep apnoea, narcolepsy, restless leg syndrome and insomnia can cause problem sleepiness. Sleep apnoea is a serious disorder in which a person's breathing is interrupted during sleep, causing the individual to awake many times during the night and experience sleepiness during the day. It is repeated pauses in breathing (apnoeas) lasting at least 10 seconds. In severe cases, hundreds of breathing pauses can occur every night. It can result either from collapse of throat (causing loud or irregular snores and/or gasps or from lack of breathing effort)

Sleep Apnoea

Is characterised by brief interruptions of breathing during sleep. It owes its name to a Greek word, apnoea, meaning "want of breath." There are two types of sleep apnoea: central and obstructive. Central sleep apnoea, occurs when the brain fails to send the appropriate signals to the breathing muscles to initiate respirations. Obstructive sleep apnoea occurs when air cannot flow into or out of the person's nose or mouth although efforts to breathe continue.

In a given night, the number of involuntary breathing pauses may be as high as 20 to 60 or more per hour. These breathing pauses are almost always accompanied by snoring between apnoea episodes, although not everyone who snores has this condition. Sleep apnoea can also be characterized by choking sensations. The frequent interruptions of deep, restorative sleep often leads to excessive daytime sleepiness.

What causes sleep Apnoea

Certain mechanical and structural problems in the airway cause the interruptions in breathing during sleep. In some people, apnoea occurs when the throat muscles and tongue relax during sleep and partially block the opening of the airway. When the muscles of the soft palate at the base of the tongue and the uvula (the small fleshy tissue hanging from the centre of the back of the throat) relax and sag, the airway becomes blocked, making breathing laboured and noisy and even stopping it altogether. Sleep apnoea also can occur in obese people when an excess amount of tissue in the airway causes it to be narrowed. Unknown to the person, this results in heavy snoring and periods of no breathing. Alcohol and sleeping pills increases the frequency and duration of breathing pauses in people with sleep apnoea.

How is sleep apnoea treated

Nasal continuous positive airway pressure (CPAP) is the most common effective treatment for sleep apnoea.

In this procedure the patient wears a mask over the nose during sleep, and pressure from an air blower forces air through the nasal passages. The air pressure is adjusted so that it is just enough to prevent the throat from collapsing during sleep. The pressure is constant and continuous. Nasal CPAP prevents airway closure while in use, but apnoea episodes

return when CPAP is stopped or it is used incorrectly. Dental appliances that reposition the lower jaw and the tongue have been helpful to some patients with mild to moderate sleep apnoea or who snore but do not have apnoea.

If you are experiencing sleepiness during the day, loud snoring or pauses in breathing during sleep or any other sleeping difficulties, make an appointment to discuss these problems with your doctor. Sleep disorders are treatable. Your doctor can evaluate your sleep problem and may refer you to a sleep specialist who has special training in sleep medicine. Many of these specialists work at sleep centres where overnight sleep studies can help determine whether you have a sleep disorder.