

SLEEP

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Sleep

- **Sleep is defined as unconsciousness from which the person can be aroused by sensory or other stimuli.**
- **Coma is unconsciousness from which the person cannot be aroused.**

Two Types of Sleep

During each night, a person goes through stages of two types of sleep that alternate with each other.

- (1) **slow-wave sleep**: because in this type of sleep the brain waves are very strong and very low frequency,
- (2) **rapid eye movement sleep (REM sleep)** : because in this type of sleep the eyes undergo rapid movements despite the fact that the person is still asleep.

Two Types of Sleep

- **Most sleep** during each night is of the slow-wave variety; this is the deep, **restful** sleep that the person experiences during the first hour of sleep after having been awake for many hours.
- **REM sleep**, on the other hand, **occurs in episodes** that occupy about 25 per cent of the sleep time in young adults; each episode normally recurs about every 90 minutes. This type of sleep is **not so restful**, and it is usually associated with **vivid dreaming**.

Slow-Wave Sleep

- **Deep sleep that occurs during the first hour after going to sleep.**
- **Restful and is associated with decrease in both peripheral vascular tone and many other vegetative functions of the body. For instance, there are 10 to 30 per cent decreases in blood pressure, respiratory rate, and basal metabolic rate**
- **Dreams of slow-wave sleep usually are not remembered.**

REM Sleep (Paradoxical Sleep, Desynchronized Sleep)

Bouts of REM sleep lasting 5 to 30 minutes usually appear on the average every 90 minutes

- 1. It is usually associated with active dreaming and active bodily muscle movements.**
- 2. The person is even more difficult to arouse by sensory stimuli than during deep slow-wave sleep, and yet people usually awaken spontaneously in the morning during an episode of REM sleep.**
- 3. Muscle tone throughout the body is exceedingly depressed, indicating strong inhibition of the spinal muscle control areas.**
- 4. Heart rate and respiratory rate usually become irregular, which is characteristic of the dream state.**

REM Sleep contd.

5. Despite the extreme inhibition of the peripheral muscles, irregular muscle movements do occur. These are in addition to the rapid movements of the eyes.

6. The brain is highly active in REM sleep, and overall brain metabolism may be increased as much as 20 per cent. The electroencephalogram (EEG) shows a pattern of brain waves similar to those that occur during wakefulness.

Sleep centers are in pons and medulla oblongata

- Sleep is caused by an active inhibitory process**
- many nerve endings of fibers from these raphe neurons secrete serotonin.**
- Stimulation of some areas in the nucleus of the tractus solitarius and diencephalon can also cause sleep.**

Electroencephalogram

There are normally four types of EEG patterns

Alpha waves are best recorded from the parietal and occipital regions while a person is awake and relaxed but with the eyes closed. These waves are rhythmic oscillations of 10 to 12 cycles/second.

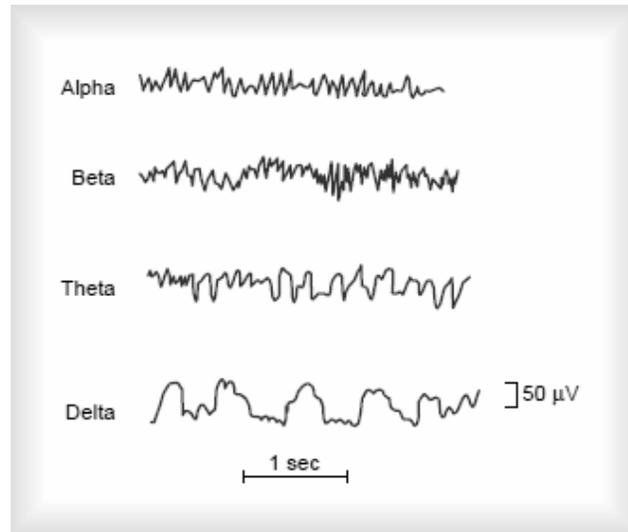
Beta waves are strongest from the frontal lobes, especially the area near the precentral gyrus. These waves are produced by visual stimuli and mental activity. Beta waves occur at a frequency of 13 to 25 cycles per second.

Electroencephalogram

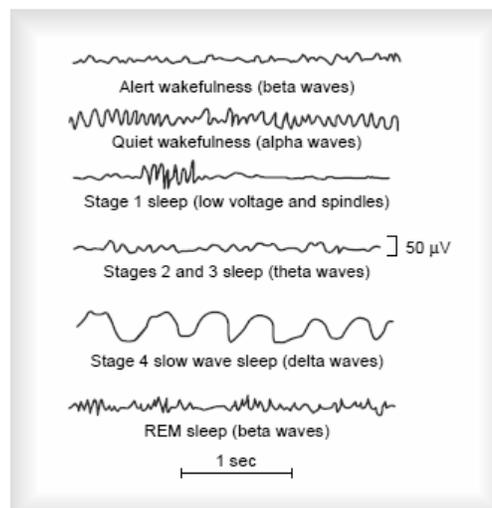
Theta waves are emitted from the temporal and occipital lobes. They have a frequency of 5 to 8 cycles/second and are common in newborn infants. The recording of theta waves in adults generally indicates severe emotional stress and can be a forewarning of a nervous breakdown.

Delta waves are seemingly emitted in a general pattern from the cerebral cortex. These waves have a frequency of 1 to 5 cycles/second and are common during sleep and in an awake infant. The presence of delta waves in an awake adult indicates brain damage.

Electroencephalogram



EEG & Sleep Stages



EEG & sleep

There are two phases of sleep:

rapid eye movement (REM) sleep, when dreams occur. During REM sleep, when the eyes move about rapidly, the EEG waves are similar to that of wakefulness. That is, they are lower in amplitude and display high-frequency oscillations.

non-REM, or resting, sleep. During non-REM sleep the EEG displays large, slow delta waves (high amplitude, low-frequency waves). Superimposed on these are *sleep spindles*, which are waxing and waning bursts of 7 to 14 cycles per second that last for 1 to 3-second periods.