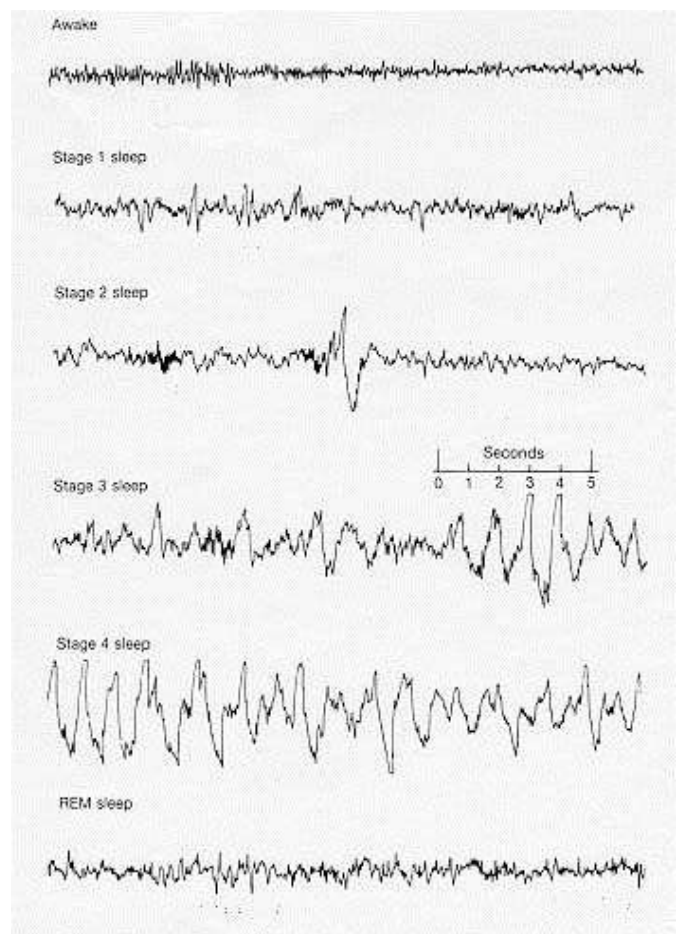


- Usually sleepers pass through five stages: 1, 2, 3, 4 and REM (Rapid Eye Movement) sleep.
- Each stage is characterized by distinct brain waves that can be measured by placing recording electrodes on the skull which monitor brain activity. This method is known as EEG (Electroencephalography).
- A complete sleep cycle takes an average of 90 to 110 minutes.
- Once completed, the cycle re-starts at Stage 1 again and the cycle continues through-out the duration of your sleep
- Sleep research is still a relatively young field; scientists did not discover REM sleep until 1953 when new mechanisms were developed to monitor brain activity.
- Before this discovery it was believed that most brain activity ceased during sleep; we now know this is NOT TRUE.

Stages of Sleep:

1. **Stage 1** is light sleep where you drift in and out of sleep and can be awakened easily. In this stage, the eyes move slowly and muscle activity slows. During this stage, many people experience sudden muscle contractions preceded by a sensation of falling.
2. In **Stage 2**, eye movement stops and brain waves become slower with only an occasional burst of rapid brain waves.
3. When a person enters **Stage 3**, extremely slow brain waves called delta waves are combined with smaller, faster waves.
4. In **Stage 4**, the brain produces delta waves almost exclusively. Stages 3 and 4 are referred to as **deep sleep**, and it is very difficult to wake someone from them. In deep sleep, there is no eye movement or muscle activity.
5. In the **REM (Rapid Eye Movement) period**, breathing becomes more rapid, irregular and shallow, eyes roll from side to side rapidly and limb muscles are temporarily paralyzed. Brain waves during this stage increase to levels experienced when a person is awake. Also, heart rate increases and blood pressure rises. Brain-waves in this REM sleep are similar to those when you are awake.



Importance of Deep Sleep (Stage 3 and 4)

- Each stage of sleep offers benefits to the sleeper. However, deep sleep is perhaps the most vital stage. Deep sleep allows the brain to go on a little vacation needed to restore the energy we expend during our waking hours. Blood flow

decreases to the brain in this stage, and redirects itself towards the muscles, restoring physical energy. Research also shows that immune functions increase during deep sleep.

- What might disrupt deep sleep? Loud noise outside or inside the home might wake you.
- **Maximize your deep sleep.** Make sure your sleep environment is as comfortable as possible and minimize outside noise.

REM: Dream Sleep

- This is the period of sleep when most dreams occur, and if awoken during REM sleep, a person can remember the dreams.
- Most people experience three to five intervals of REM sleep each night.
- It is essential to our minds for processing and consolidating emotions, memories and stress. It is also thought to be vital to learning, stimulating the brain regions used in learning and developing new skills.
- There are different theories as to why you dream. Freud thought that dreams were the processing of unconscious desires. Today, researchers wonder if it may be the brain's way of processing random fragments of information received during the day. Much of dreaming is still a mystery.
- Studies have shown that better REM sleep helps boost your mood during the day. How can you get more REM sleep? One simple way is to try to sleep a little more in the morning. As your sleep cycles through the night, it starts with longer periods of deep sleep. By the morning, the REM sleep stage is longer. Try sleeping an extra half hour to hour and see if your mood improves.
- Infants spend almost 50% of their time in REM sleep. Adults spend nearly half of sleep time in stage 2, about 20% in REM and the other 30% is divided between the other three stages. Older adults spend progressively less time in REM sleep.

How we fall asleep?

- How do our bodies know when it is time to sleep? We all have an internal **Circadian Clock** that provides cues for when it is time to sleep and time to wake. This clock is sensitive to light and time of day, which is why having a good bedtime routine and a quiet dark place to sleep is so important.

- At the same time, a chemical messenger called adenosine builds up during the day as our bodies are busy using energy. The more adenosine builds up in the brain, the sleepier you will feel. In order to test this idea, Legrende and Pieron (1913) kept dogs awake for several days. Then, they extracted cerebrospinal fluid (containing adenosine) from these animals and were able to induce sleep by injecting the fluid into the ventricular system of non-sleep deprived dogs.
- Adenosine combined with the circadian clock sends a powerful message of sleepiness to your body.
- To reduce the effects of jet lag, some therapists try to manipulate the biological clock with a technique called light therapy. They expose people to special lights, many times brighter than ordinary household light, for several hours near the time the subjects want to wake up. This helps them reset their biological clocks and adjust to a new time zone.

Sleep Disorders

Snoring:

- Snoring is caused by a narrowing of your airway, either from poor sleep posture or abnormalities of the soft tissues in your throat. A narrow airway gets in the way of smooth breathing and creates the sound of snoring.
- Snoring can affect the quantity and *quality* of your sleep. Poor sleep can lead to daytime fatigue, irritability and increased health problems.
- Can be helped by sleeping on your side, elevating your head off your bed and by clearing your nasal passages before sleep

Sleep Apnea:

- Sleep Apnea is a deceiving sleep disorder - 90% of people who have sleep apnea don't know that they have it!
- Patients experience frequent silences during sleep due to breaks in breathing (apnea) followed by choking or gasping o get air into the lungs.
- A person with sleep apnea stops breathing repeatedly while sleeping, anywhere from 10 seconds to 3 minutes.

Insomnia:

- Insomnia is the inability to get high-quality sleep. It is characterized by the following symptoms:
 - Difficulty falling asleep despite being tired
 - Awakening frequently or lying awake in the middle of the night
 - Awakening too early in the morning and not feeling refreshed
- It is a common sleep problem and can be caused by a variety of things including stress, a change in time zones, an altered sleep schedule or poor bedtime habits.

Restless legs syndrome (RLS):

- RLS is a disorder causing an almost irresistible urge to move the legs (or arms). The urge to move occurs when resting or lying down and is usually due to uncomfortable, tingly, or creeping sensations in the legs or affected limbs.
- Movement eases the feelings, but only for a while.
- It is caused by an imbalance of dopamine. Levels of dopamine, a brain chemical that affects movement, naturally fall at night, which could be why RLS symptoms often get worse late in the day and at night.

Narcolepsy:

- A neurological disorder that causes extreme sleepiness and may even make a person fall asleep suddenly and without warning.
- Specific causes of narcolepsy are not known but people with narcolepsy are lacking *hypocretin*, a brain chemical which regulates sleep and wakefulness.
- The “sleep attacks” make it difficult for people to live normal lives. Falling asleep during activities like walking, driving or working can have dangerous results.
- Narcoleptics have unique sleep cycles. They enter the REM, or dream, phase of sleep right after falling asleep, whereas most people take about 90 minutes to enter the REM phase.
- Therefore, someone with narcolepsy will experience the characteristics of REM sleep (vivid dreams and muscle paralysis) at the beginning of sleep.