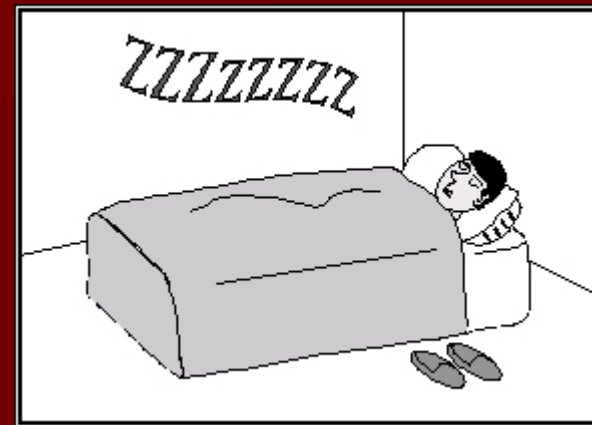


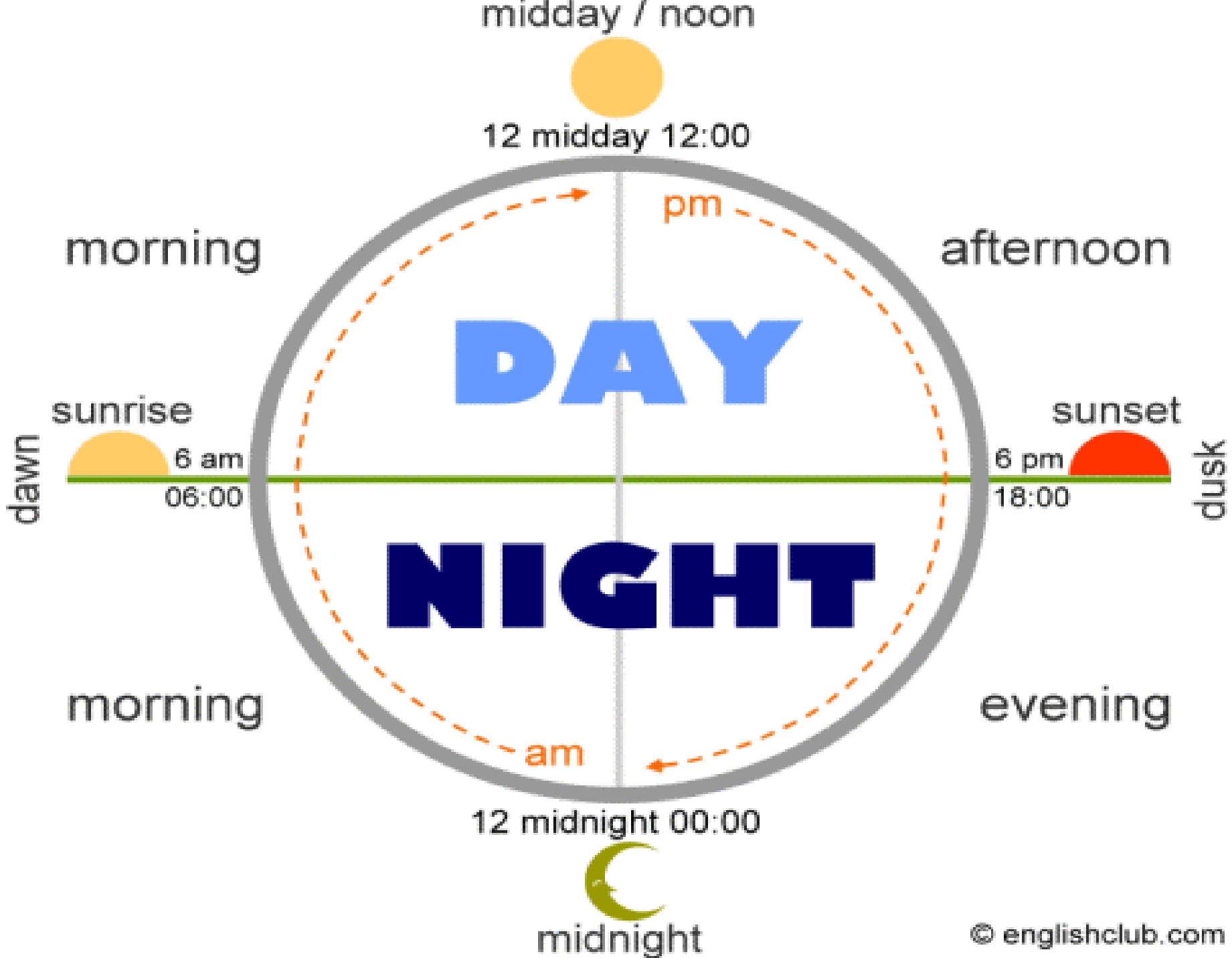
# Night sleep

Scientific facts

By

Prof. Afaf El-Ansary





# Information about sleep

- Sleep is a behavioral state that is a natural part of every individual's life.
- We spend about one-third of our lives asleep.
- Sleep is a required activity, not an option.
- sleep is important for normal motor and cognitive function.
- We all recognize and feel the need to sleep.
- After sleeping, we recognize changes that have occurred, as we feel rested and more alert.
- Sleep actually appears to be required for survival. Rats deprived of sleep will die within two to three weeks, a time frame similar to death due to starvation.

# Why Sleep?

- 1. Sleep is essential for normal function and even survival.
- 2. Possible reasons for sleep usually involve some "recovery" process.
  - a. Tissue repair.
  - b. Resting the body and brain.
  - c. Brain anabolism (e.g., synthesis of glycogen).
  - d. Consolidation of memory and daily experiences.

# Sleepiness

- *Problem sleepiness may be associated with:*
  - difficulty concentrating,
  - memory lapses,
  - loss of energy,
  - fatigue, lethargy,
  - and emotional instability.

Lifestyle factors and undiagnosed or untreated sleep disorders can cause problem

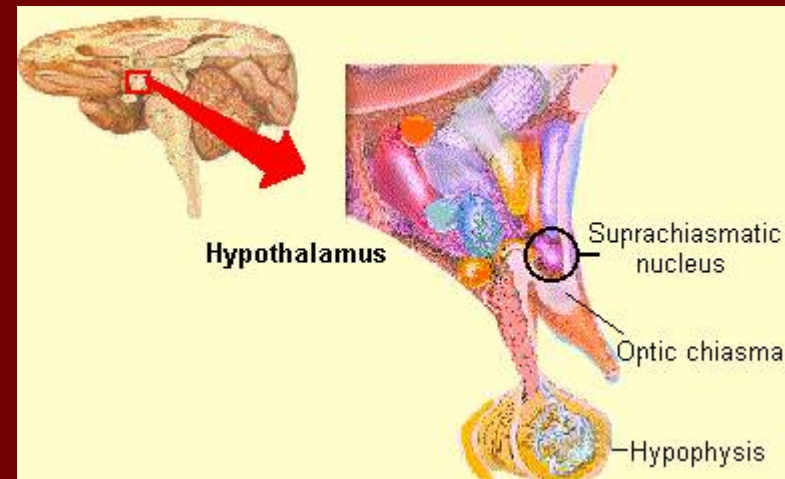
# The Biological clock

The activity of this clock makes us sleepy at night and awake during the day. Our clock cycles with an approximately 24-hour period and is called a **circadian** clock.



# Location of the circadian clock

- In humans, this clock is located in the **suprachiasmatic nucleus (SCN)**. The SCN is actually a very small structure consisting of a pair of pinhead-size regions, each containing only about 10,000 neurons out of the brain's estimated 100 billion neurons.



- Because of your biological clock, you naturally feel the most sleepy between midnight and 7 a.m.





- Your biological clock makes you the most alert during daylight hours and the most drowsy in the early morning hours. Consequently, most people do their best work during the day.



- *Our biological clock which controls our sleep/wake cycle will attempt to function according to a normal day/night schedule even when we try to change it.*

=



- The cue that synchronizes the internal biological clock to the environmental cycle is light.
- **Photoreceptors** in the retina transmit light-dependent signals to the SCN.



# Misconceptions about Sleep

- Sleep is time for the body in general and the brain specifically to shut down for rest.
- Getting just one hour less sleep per night than needed will not have any effect on daytime functioning.
- The body adjusts quickly to different sleep schedules.
- People need less sleep as they grow older.
- “good night’s sleep” can cure problems with excessive daytime sleepiness.

# Phases of night sleeping

- There are 4 phases:
- W1.....awake eyes open
- W2.....awake, eyes closed
- S1.....Sleeping phase I
- S2.....Sleeping phase II



# Stages of sleep

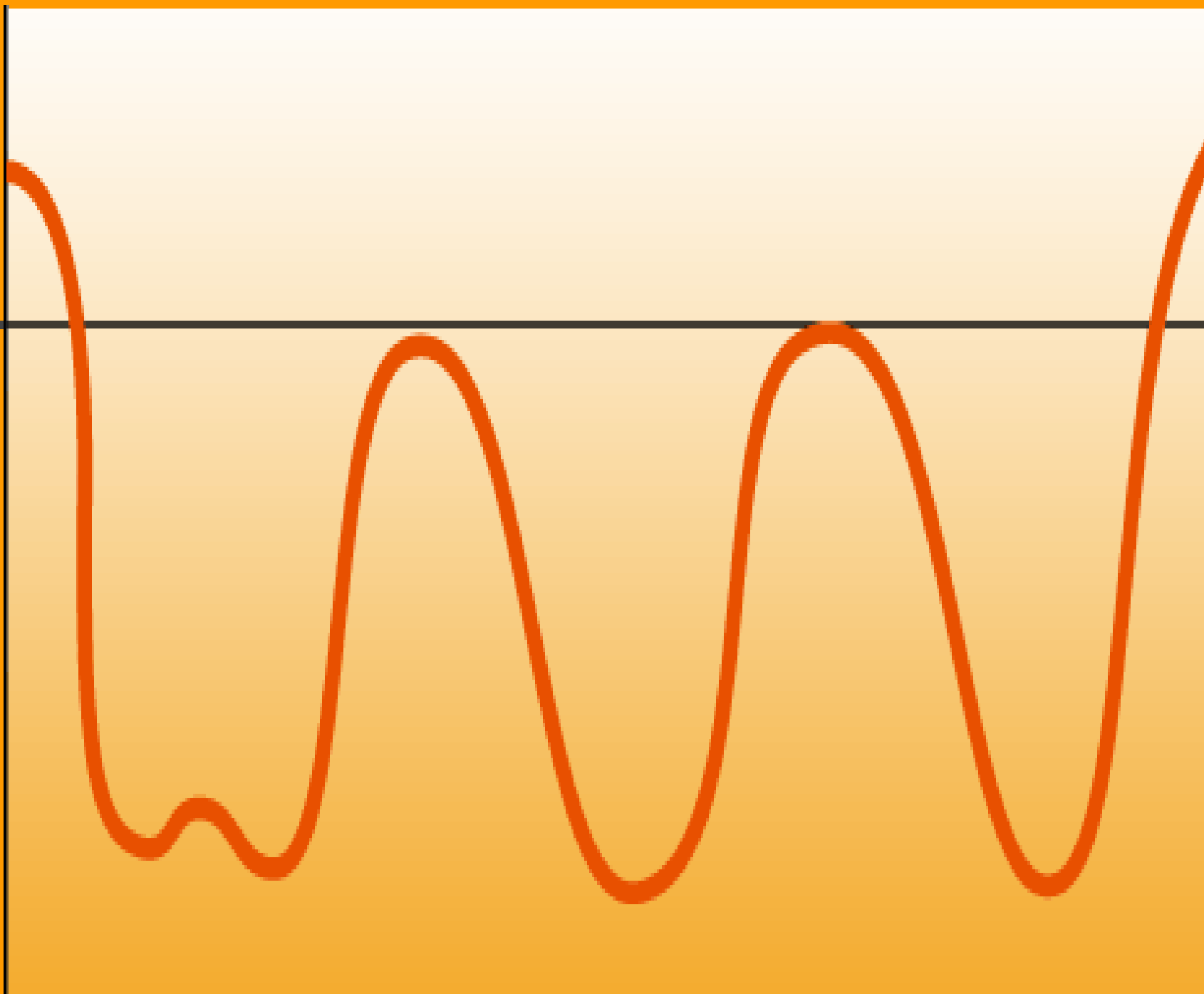
Two basic stages, or states, of sleep:

- Non rapid eye movement) NREM.  
and rapid eye movement) REM.
- As the night progresses, however, the amount of deep NREM sleep decreases and the amount of REM sleep increases.

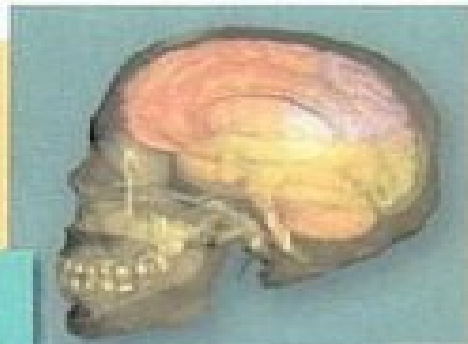
awake

light  
sleep

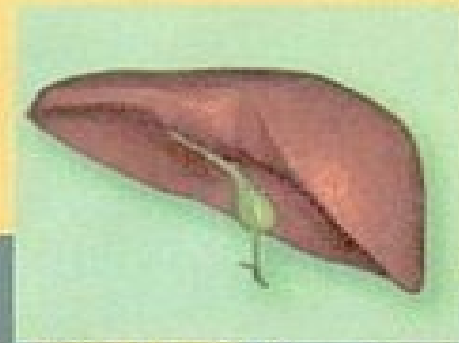
deep  
sleep



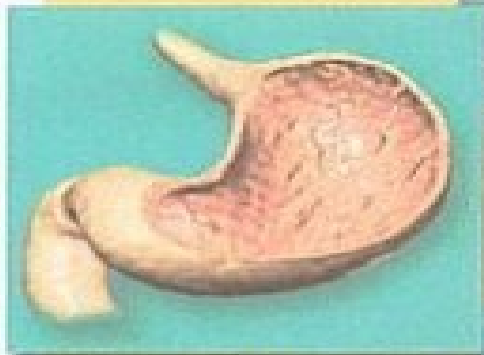
# The function of organs during the sleep



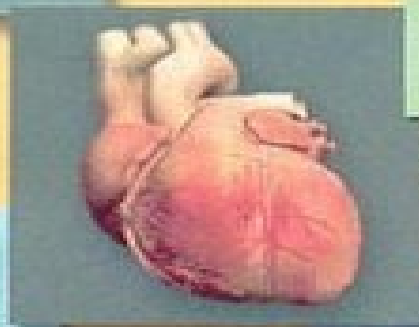
**Brain**



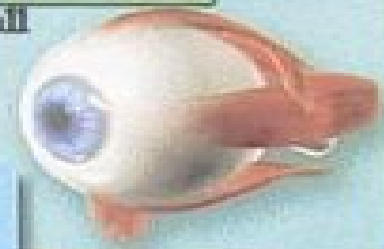
**Liver & Gall Bladder**



**Stomach**



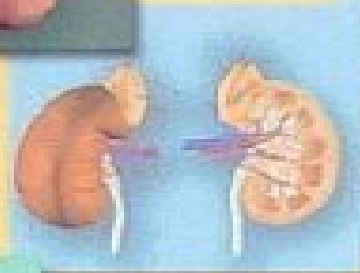
**Heart**



**Eye**



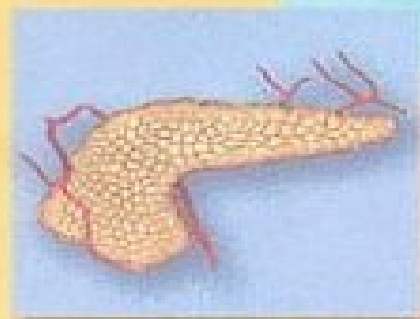
**Duodenum & Colon**



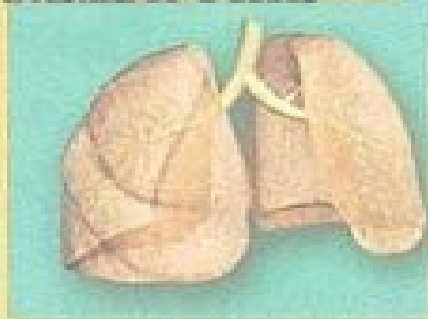
**Kidney**



**Bladder & Prostate**



**Pancreas**



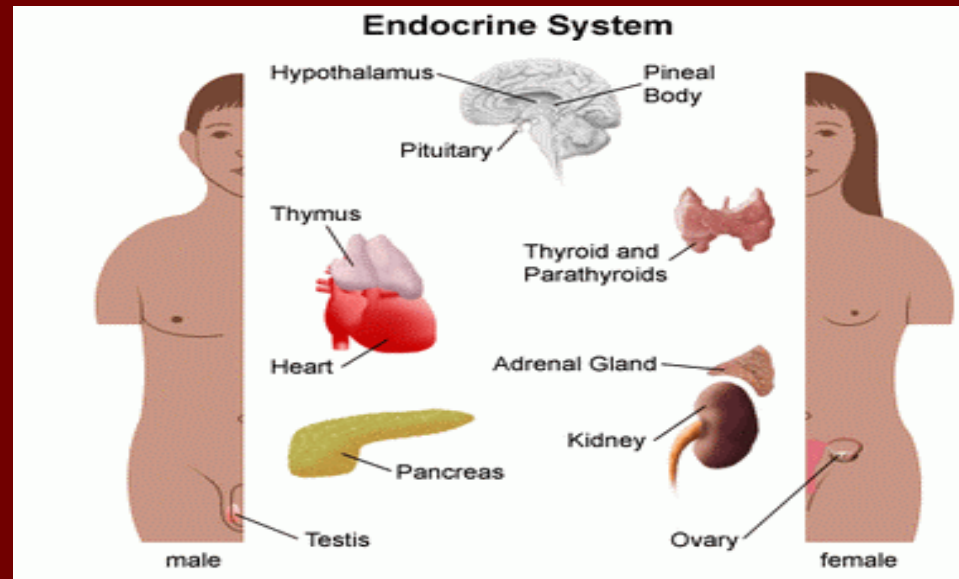
**Lung**



# The Endocrine System

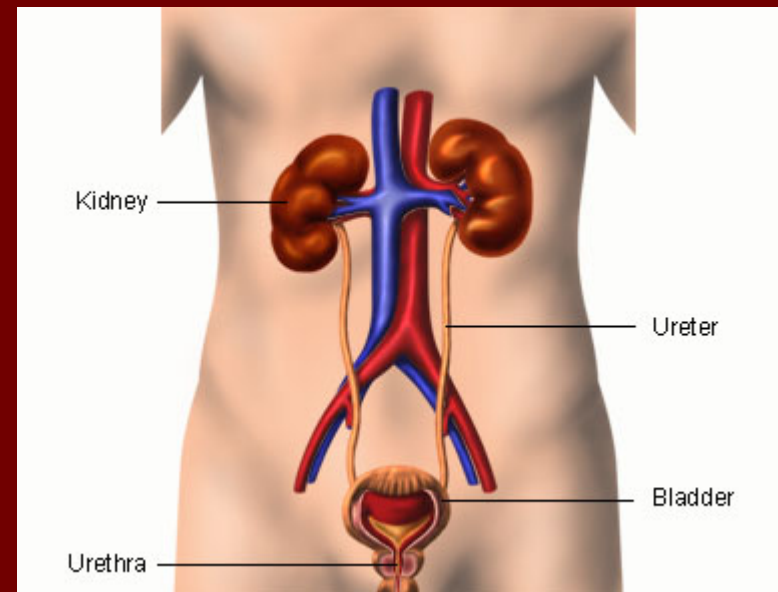
Sleep is one of the events that modify the timing of secretion for certain hormones. Many hormones are secreted into the blood during sleep.

- \* The release of **growth hormone** is related in part to repair processes that occur during sleep.
- \* **Follicle stimulating hormone** and **luteinizing hormone**, which are involved in maturational and reproductive processes, are among the hormones released during sleep.
- \* **Thyroid-stimulating hormone**, are released prior to sleep .



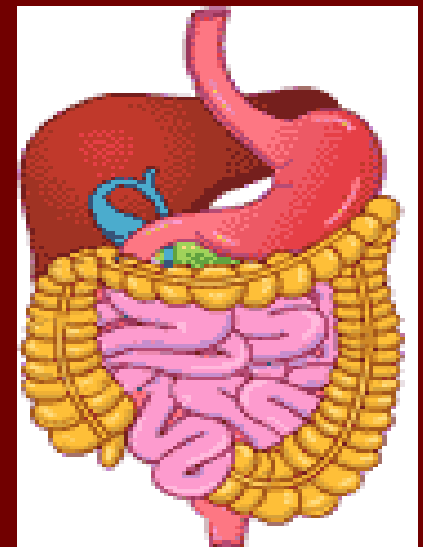
# Renal system

Kidney filtration, plasma flow, and the excretion of sodium, chloride, potassium, and calcium all are reduced during both NREM and REM sleep. These changes cause urine to be more concentrated during sleep .



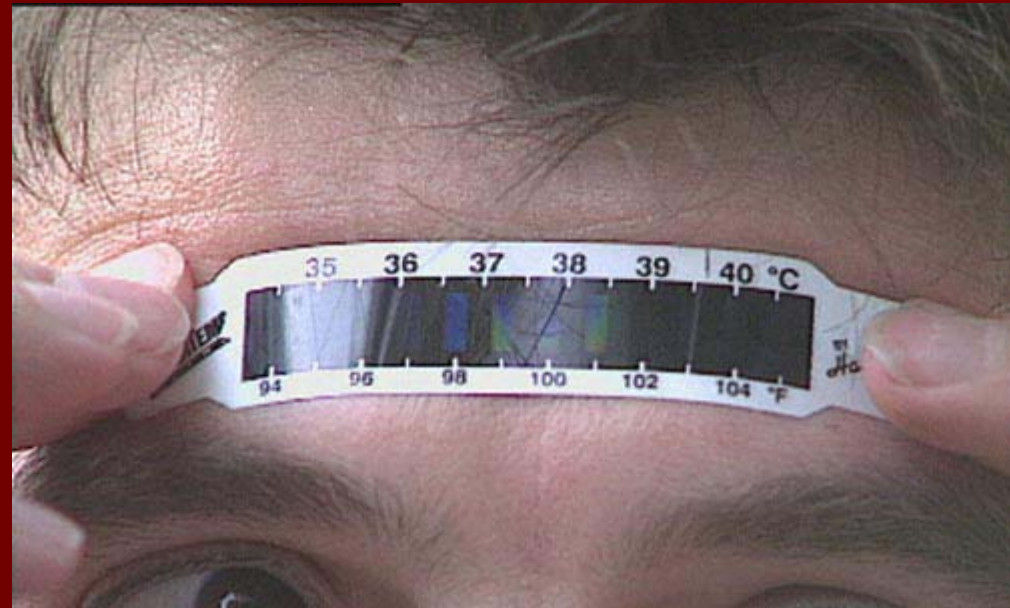
# The digestive system

- *Alimentary activity* .In a person with normal digestive function, gastric acid secretion is reduced during sleep. In those with an active ulcer, gastric acid secretion is actually increased and swallowing occurs less frequently .



# Body temperature

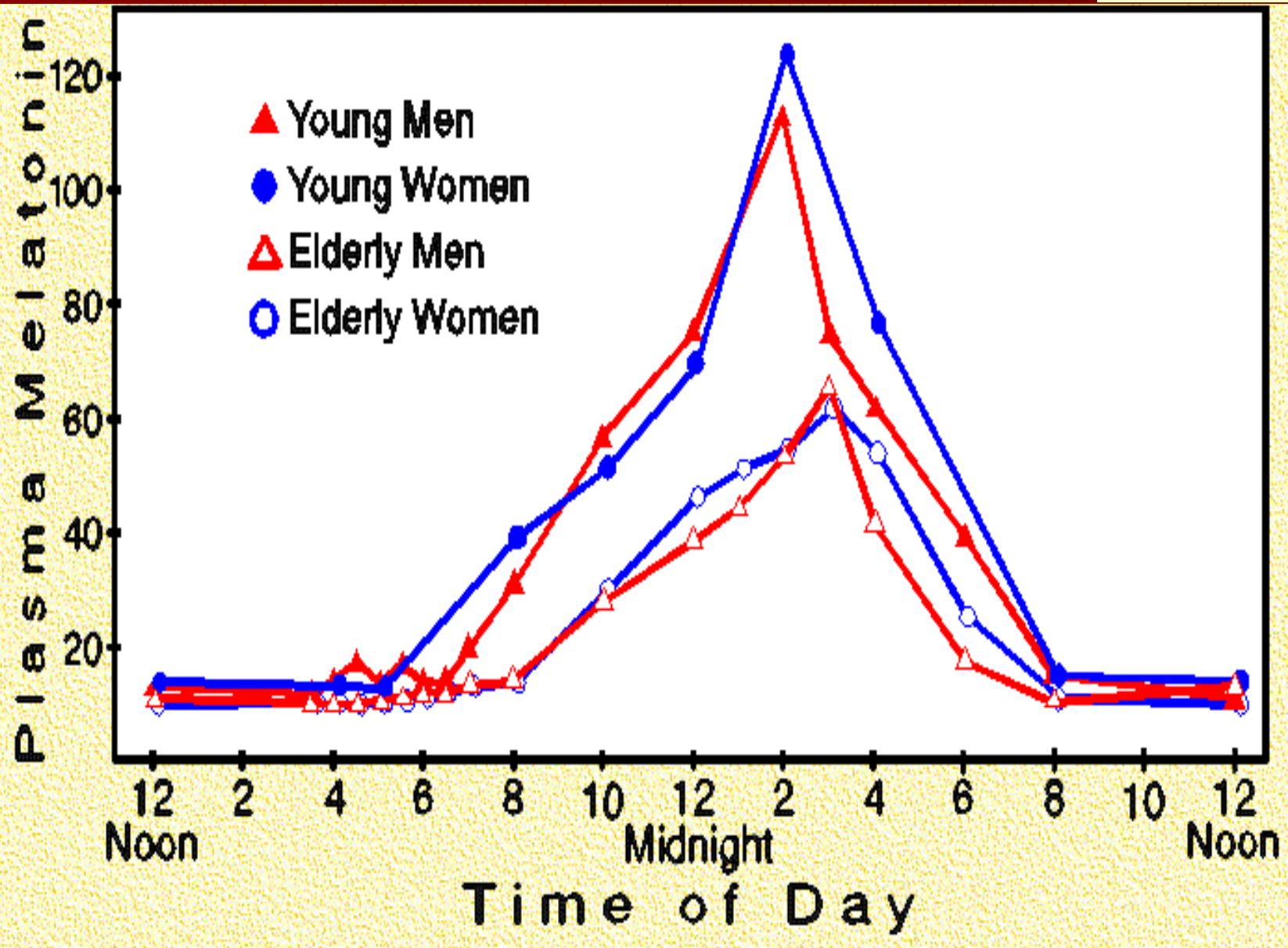
- Another interesting rhythm that is controlled by the biological clock is the cycle of body temperature, which is lowest in the biological night and rises in the biological daytime. This fluctuation persists even in the absence of sleep. Activity during the day and sleep during the night reinforce this cycle of changes in body temperature.



# Melatonin secretion

- The release of **melatonin** ,a hormone produced by the pineal gland, is controlled by the circadian clock in the SCN. Its levels rise during the night and decline at dawn. Melatonin has been called the hormone of darkness because of this pattern .







# How to increase melatonin secretion

- **Keep your mealtimes as regular as possible to keep your body in sync with the rhythms of the day.**
- **Keep your diet light at night.**
- **Avoid stimulants.**
- **Avoid exercising late at night.**



# How much sleep do you need?

- Not everyone needs the same amount of sleep Natural short and long sleepers
- BUT sleeping less than 6.5 or more than 9 hours is associated with 1.7 x greater mortality & risk of disease.



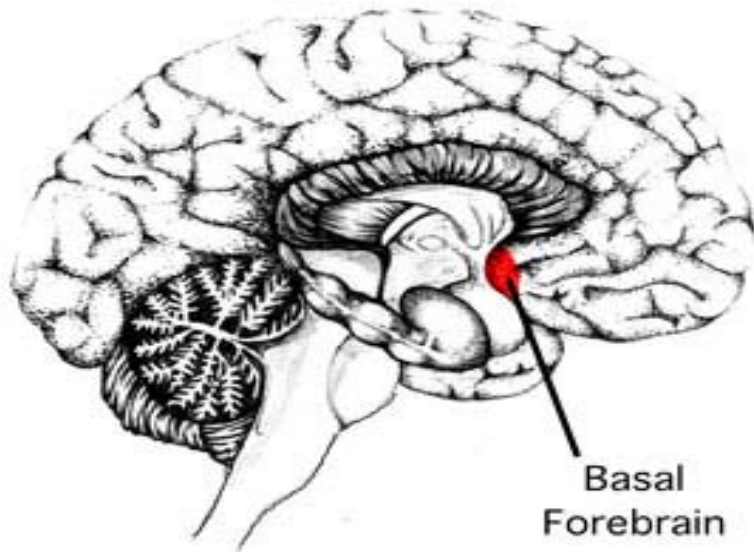
# Consequences of Sleep Loss

- Poor academic performance correlated with insomnia & poor sleep quality
- Automobile Accidents: Fatigue is a leading cause
- Minor medical Illness: Cold & Flu rates higher in poor sleepers
- Circadian dysregulation: Creating Jet Lag in the home environment
- **Psychiatric Illness:**  
**Depression & Anxiety**



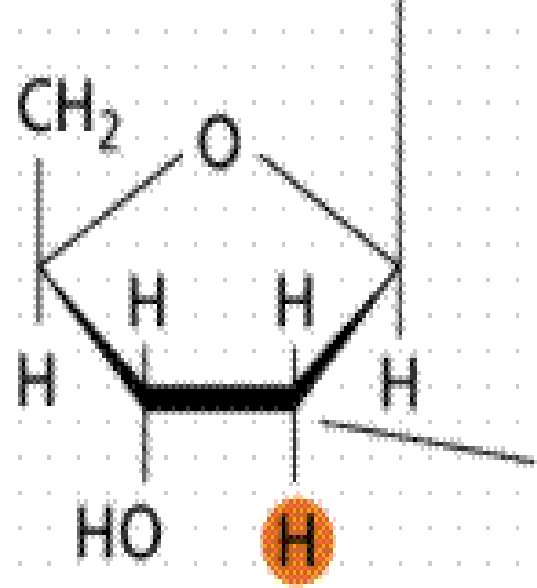
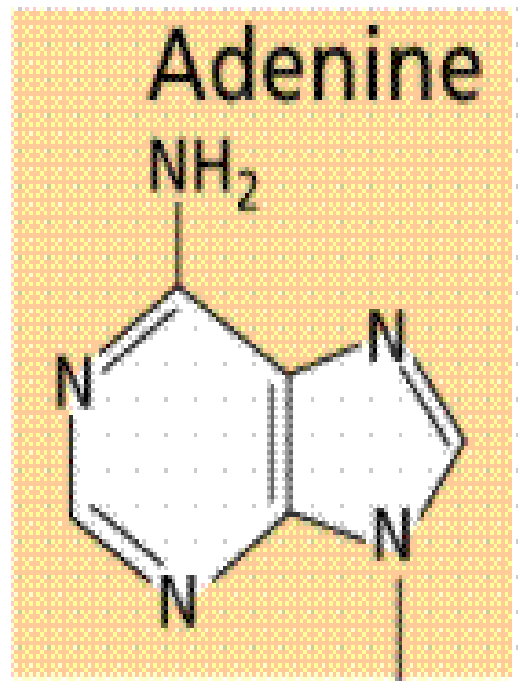
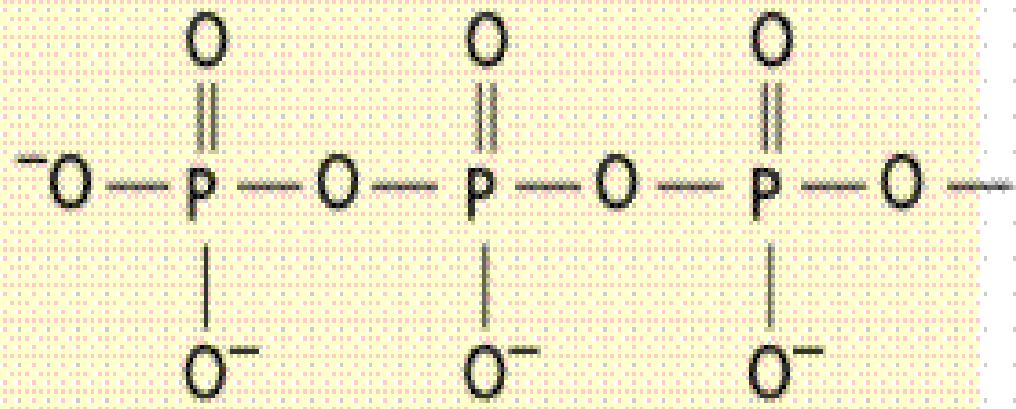
# Adenosine

- Adenosine release in the brain may occur when energy-storing molecules containing adenosin triphosphate (ATP) are broken down to provide energy for cell activity. When brain cells burn ATP, adenosine builds up. The longer humans are awake, the higher the levels of this chemical in their brains .



# Deoxy-ATP (deoxyadenosine triphosphate)

Phosphate groups



Deoxy-ribose sugar

# Interleukin and Histamine

- A compound called interleukin, present in cells all over the body, may foster the sleepiness associated with infection and inflammation.
- Another brain chemical, histamine, may promote wakefulness with an input into the hypothalamus and possibly to c-fos cells .



Sleep Well...Live Well