

Human Physiology, Motor System

Dr. Shahid Javed
MBBS; PhD

An electroencephalogram (EEG) is a record of postsynaptic activity of neurons

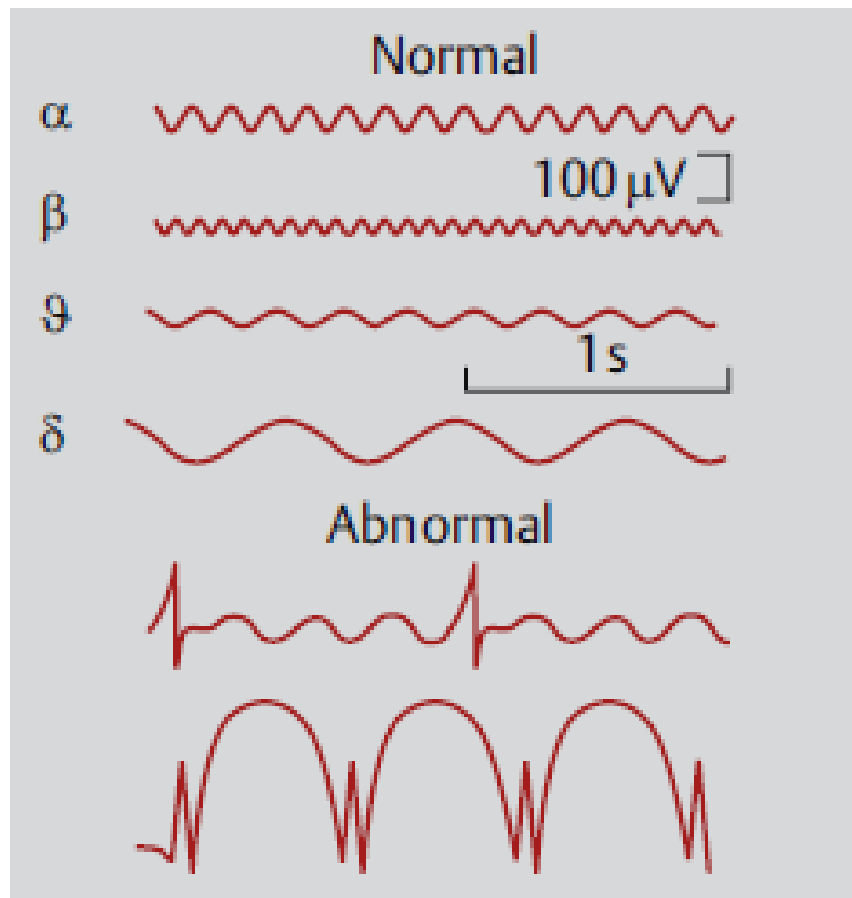
- Undulations in the recordings of electrical potential from the surface of brain or even from the outer surface of head. The entire record is called EEG
- As a clinical tool in diagnosis of cerebral dysfunction like epilepsy
- As a legal determination of brain death
- As to distinguish various stages of sleep

(a) Alpha rhythm (relaxed with eyes closed)



(b) Beta rhythm (alert)





Frequency

8-13 Hz

14-30 Hz

4-7 Hz

0.5-3 Hz

Paroxysmal spikes

Paroxysmal waves

3 Hz spikes and waves

Alpha waves

- Character → rhythmical
- Frequency → 8-13cycles per sec.
- Voltage → about 50 micro volts
- Site of recording → almost intensely in occipital region but can also be recorded from parietal and frontal regions
- Occur normally in EEG of adult people when they are awake and in quiet, resting state

Beta waves

- Character → asynchronous
- Frequency → 14-30 cycles per sec.
- Voltage → low voltage
- Site of recording → from parietal and frontal regions
- They occur when awake person's attention is directed to some specific type of mental activity e.g opening the eyes

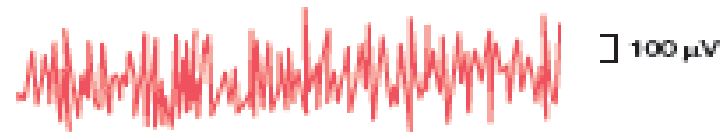
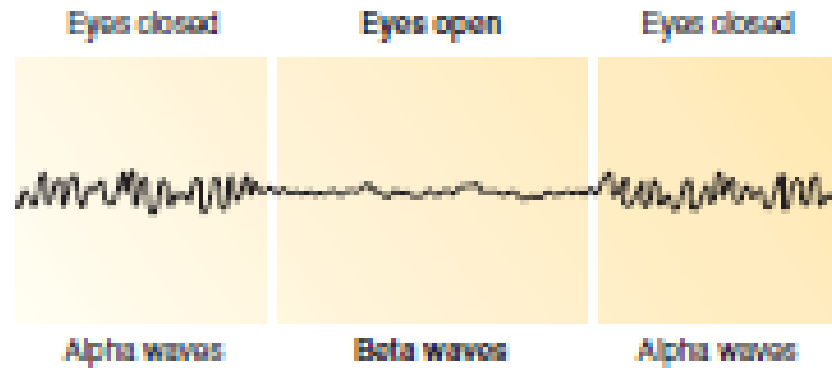
Theta waves

- Frequency → 4-7cycles per sec.
- Site of recording → from temporal and parietal regions of brain in children
- They occur normally in children but in adults in case of emotional stress

In many brain disorders e.g degenerative brain states

Delta waves

- Character → synchronous
- Frequency → less than 3.5 cycles per sec.
- Voltage → 2-4 times greater than most of other brain waves
- They occur in very deep sleep, in infancy and in serious organic brain diseases



Grand mal epilepsy

- Extreme neuronal discharges in all areas of brain
- Signs and symptoms
 - Generalized tonic seizures
 - Tonic clonic seizures
 - Tongue bite
 - Difficult breathing
 - Cyanosis
 - Incontinence of urine and stool
 - post seizure depression
- EEG
 - High voltage, high frequency discharges occur over entire cortex

Hereditary predisposition

Factors that can increase the excitability of abnormal circuits are

- strong emotional stimuli
- alkalosis caused by over breathing
- drugs
- fever
- loud noises and flashing lights
- What stops the grand mal attack
 - neuronal fatigue
 - active inhibition by inhibitory neurons that have been activated by the attack

Petit mal epilepsy

- Extreme neuronal discharge in thalamocortical brain activating system
- Signs and symptoms
 - 3-30 seconds of unconsciousness
 - Twitch like contractions of muscles usually in head region
 - Blinking of eyes
- It is also called absence syndrome or absence epilepsy
- EEG
 - spike and dome pattern

Focal epilepsy

- It can involve any local part of the brain
 - Such localized organic lesion may be
 - 1) scar tissue in the brain that pulls on the adjacent neuronal tissue
 - 2) a tumor that compresses an area of the brain
- A short period of amnesia
Anxiety, discomfort and fear
Incoherent speech
- EEG: low frequency , rectangular waves