ELECTROENCEPHALOGRAPHY (EEG)

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Components

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- Requirements
- History
- Working
- Advantages
- Disadvantages
- Applications
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INTRODUCTION

- EEG stands for Electroencephalography
- It's record the electrical activity of brain.
- During an EEG test , small electrodes like cup or disc type are placed on the scalp.
- They pick up the brain's Eletrical signals and send them to a machine called Electroencephalogram.

- It records the signals as wavy lines on to a computer screen or paper in order of microvolt.

- EEG waves

  frequency range = 0.1 to 100

  amplitude = 2 to 200 micro volt.

REQUIREMENTS

- EEG (8/16 channels).
- Silver cup electrodes / metallic bridge electrodes.
- Electrode jelly.
- Rubber cap.
- Quiet dark comfortable room.
- Skin pencil & measuring tape.

HISTORY OF EEG

- In 1875 - Richard caton (physician) from Germany, Discovered electrical activity of brain by probing the surface of exposed brains (cerebral hemispheres) of animals (Rabbits & Monkeys).

- In 1890 - Adolf Beck (polish physiologist) of Poland, investigations of spontaneous electrical activity of the brain of Rabbits & Dogs.

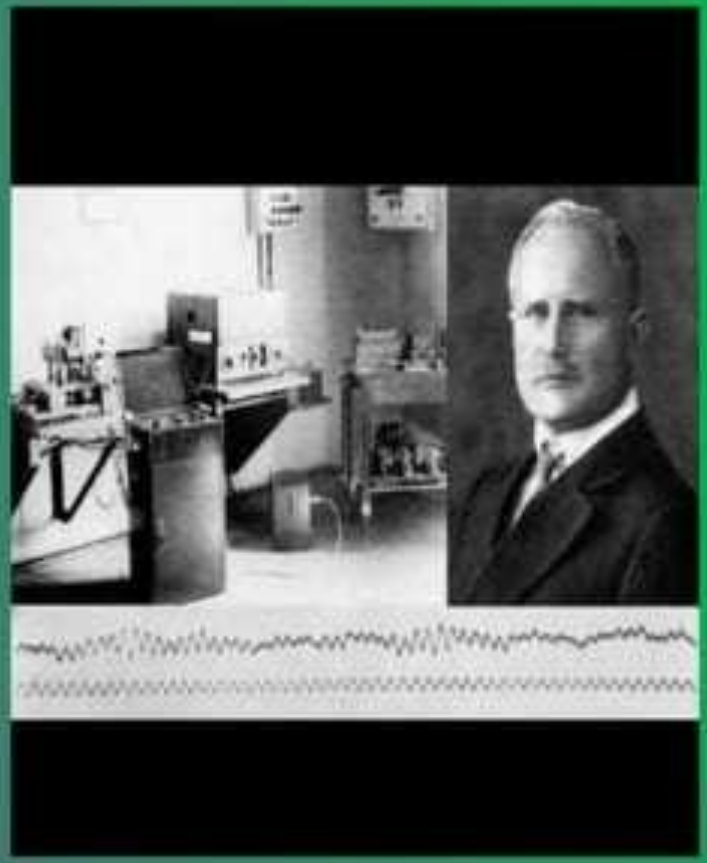
- In 1920 - Hans Berger (Austrian psychiatrist) was the first to record EEG tracings from human beings.

  He Discovered waves at 10HZ.(Alpha waves because they were the first he isolated in the human EEG).

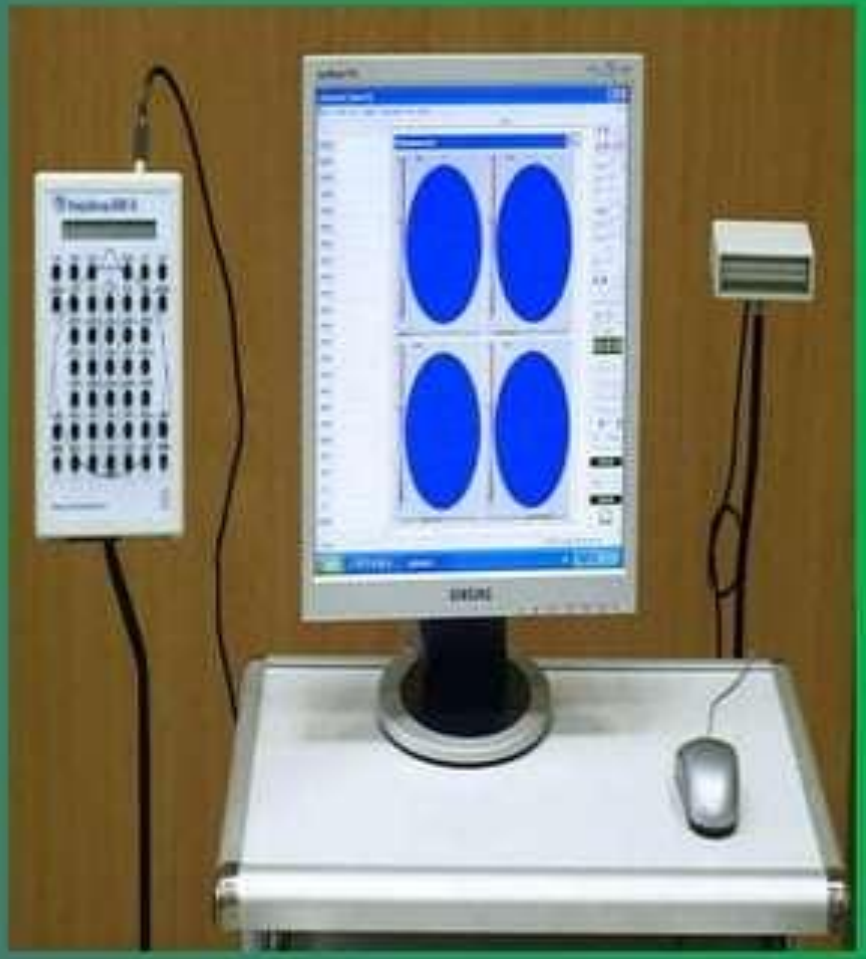
- In 1935 - Forester & Alteberger they first use of intra operative EEG.

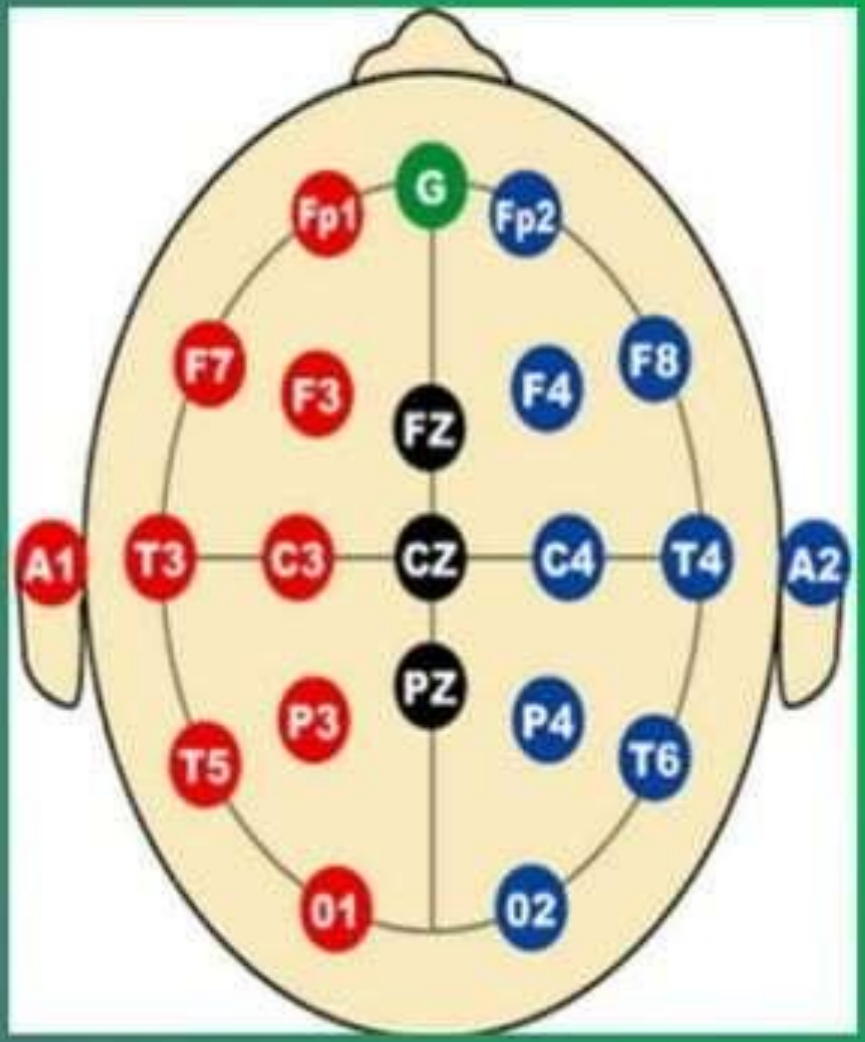
- In 1950 - Herbert jasper & Wilder penfield developed this technique, using ECoG for localization &surgical treatment of epilepsy

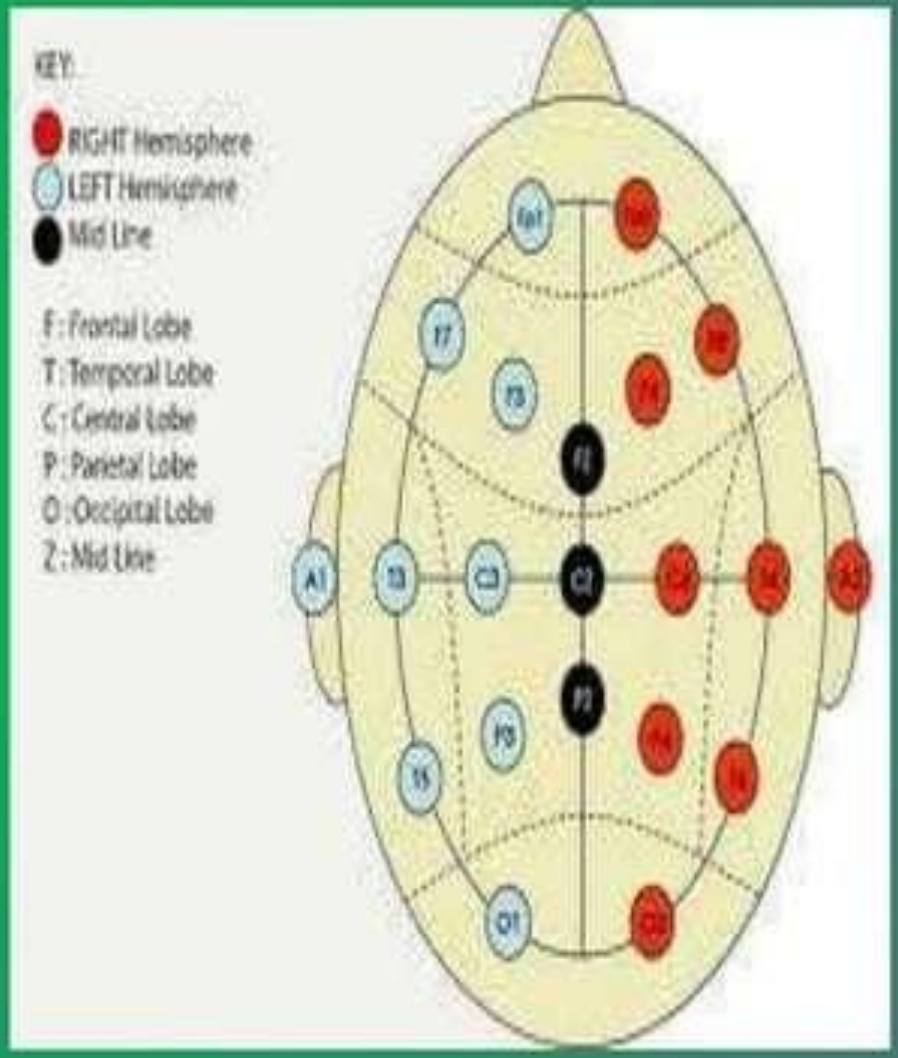
Older Generation



Current Generation




G
Fp1
Fp2
F7
F3
F4
F8
FZ
A1
T3
C3
CZ
C4
T4
A2
PZ
P3
P4
T5
T6
01
02


KEY:
RIGHT Hemisphere
LEFT Hemisphere
Mid Line
F : Frontal Lobe
T : Temporal Lobe
C : Central Lobe
P : Parietal Lobe
O : Occipital Lobe
Z : Mid Line

PROCEDURE

- A standard non – invasive EEG takes about 1 hour.

  The patient will be positioned on a padded bed or table , or in comfortable chair.
- To measure the electrical activity in various part of the brain , a nurse or EEG technician will attach 16 to 20 electrodes to the scalp.
- The brain generates electrical impulses that these electrodes will pick up. Then a temporary glue will be used to attach them to the skin , no gain will be involved.

TYPES OF LOBES

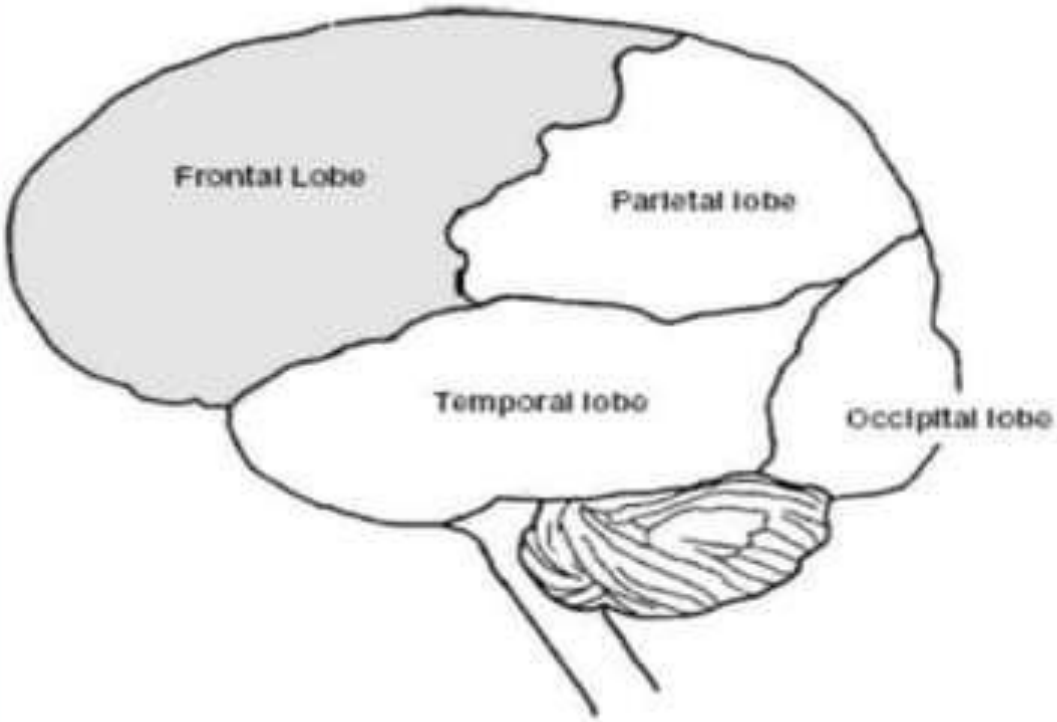
- Frontal lobes:

  Emotional & motor control.
- Parietal lobes:

  Sensory purpose (pain , touch, pressure).
- Temporal lobes:

  Auditory system (hear & sound).
- Occipital lobes:

  Visual purpose (see & eye).


Frontal Lobe
Parietal lobe
Temporal lobe
Occipital lobe

WHY EEG IS USED?

- Where there is a need to diagnose & manage epilepsy.
- Used to investigate other conditions such as head injuries , brain tumours , dementia , hemorrhage.
- Determine the level of brain function in people who are in a coma.
- Identify areas of the brain that are not working properly.

TYPES OF WAVES

- Alpha waves
- Beta waves
- Delta waves
- Theta waves

Alpha waves

- Alpha waves are found in normal persons (resting state), when they are awake .
- They occur in occipital region .
- Alpha waves are 8 - 13 HZ.
- Alpha waves are present, they indicate a calm & releaxed state.

Beta waves

- Beta waves are recorded from parietal & frontal region of scalp.
- Divided into 2 types.

  Beta - 1 which is inhibited by cerebral activity.

  Beta - 2 excited by mental activity like tension.

- Beta waves are 13 - 30 HZ.
- Beta waves indicate can alert such as when you focus on solving a problem.

Theta waves

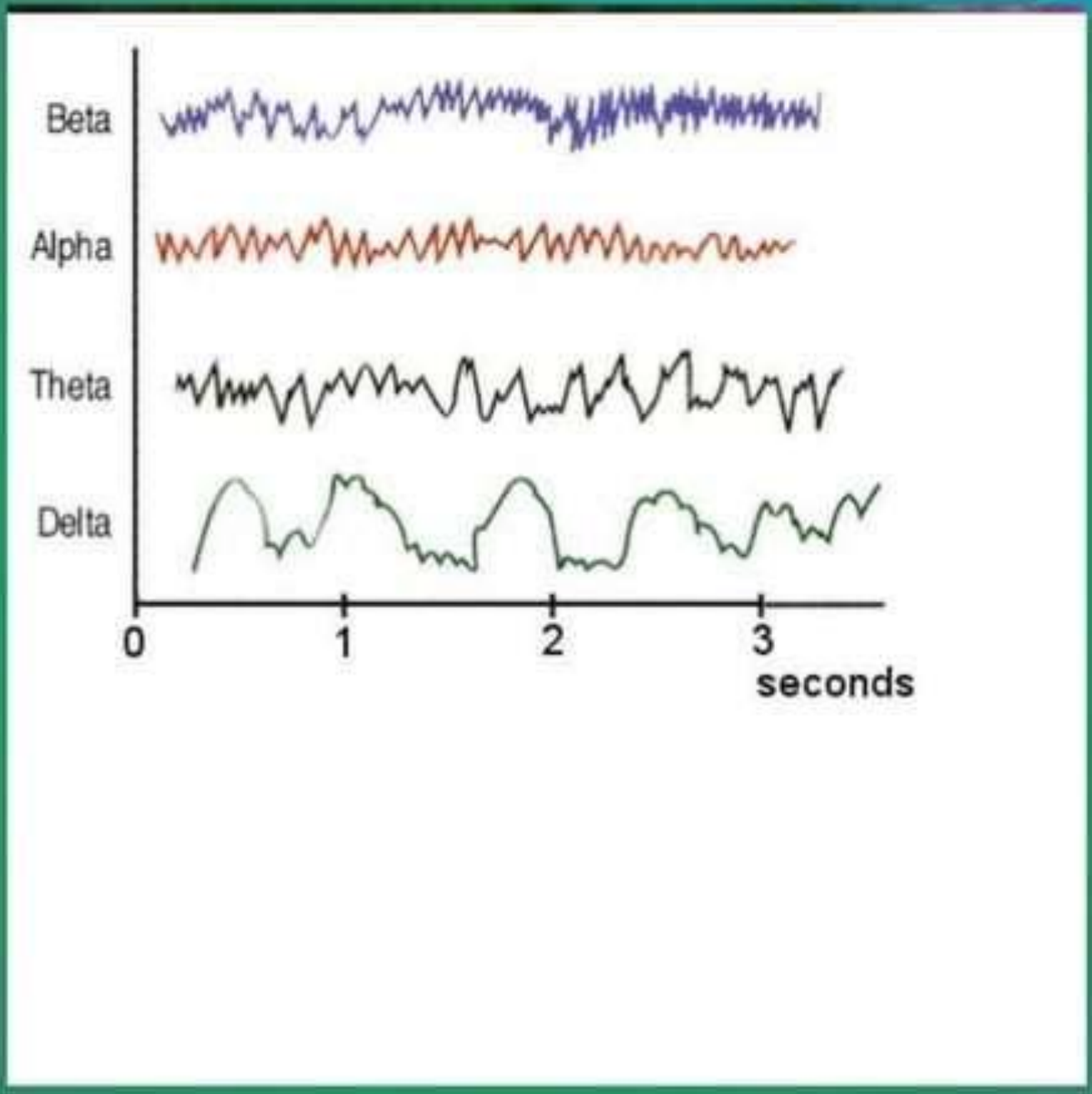
- Theta waves are recorded from temporal region of scalp from children.
- They occur stress & frustration.
- Theta waves are 4 - 8 HZ.
- Theta waves observed when you are day dreaming & drowsiness.

- Brain disorders (Adult , children , premature , serious brain disorders).

- Emotional questions are asked get in the theta waves.

Delta waves

- Delta waves are recorded from cortex region.
- They occur deep sleep in premature babies & incases of brain diseases.
- Delta waves are 0.5 - 4 HZ.
- Delta waves observed when you are day dreaming & drowsiness.
- 2 - 3 seconds gets in the waves.


Beta
Alpha
Theta
Delta
0
1
2
3
seconds

Advantages

- Non - invasive & harmless
- Lower costs
- Portable
- High temporal resolution

Disadvantages

- High noise ratio
- Not very exact measuring
- Skull weakness the electrical activity
- Low spatial resolution

Applications

- Epilepsy
- Brain death testing
- Various brain cancer Sleep disorders (insomnia) , nacrolepsy , (uncontrollable sleep).
- Sleep paralysis (inability to move during full consiousness).
- Chronic hypersomnia (excessive sleep or sleepiness).

THANK YOU