



# Electroencephalography (EEG)

[Source: TH](#)

## Why in News?

Recently, **electroencephalography** has been in the news due to the **centenary year of the first human EEG**, pioneered by German physiologist Hans Berger.

- Vladimir Pravdich-Neminsky achieved the first mammalian EEG in 1912 with a dog's brain, **followed by Hans Berger in 1924** with the first human EEG.

## What is EEG?

### ▪ About:

- EEG stands for electroencephalography. 'Electro-' pertains to electricity; '-encephalo-' refers to the brain; and '-graphy' is a suffix meaning to show or to represent.
- The EEG is a remarkable tool in physics and neurobiology, **offering a straightforward glimpse into the human brain's workings**, without invasive procedures.
- An EEG setup is **simple, cost-effective, non-invasive**, portable, space-efficient, and doesn't emit high-energy radiation or sounds, unlike MRI.

### ▪ Working:

- Volume conduction is the interference that **happens between the source of an electrical potential** and the electrode measuring that potential.
  - It occurs when electrical potentials is measured at a distance from their source.
- Neurons in the **brain constantly exchange ions** with their surroundings, **creating waves of electrical activity** that electrodes on the scalp track to produce an electroencephalogram.

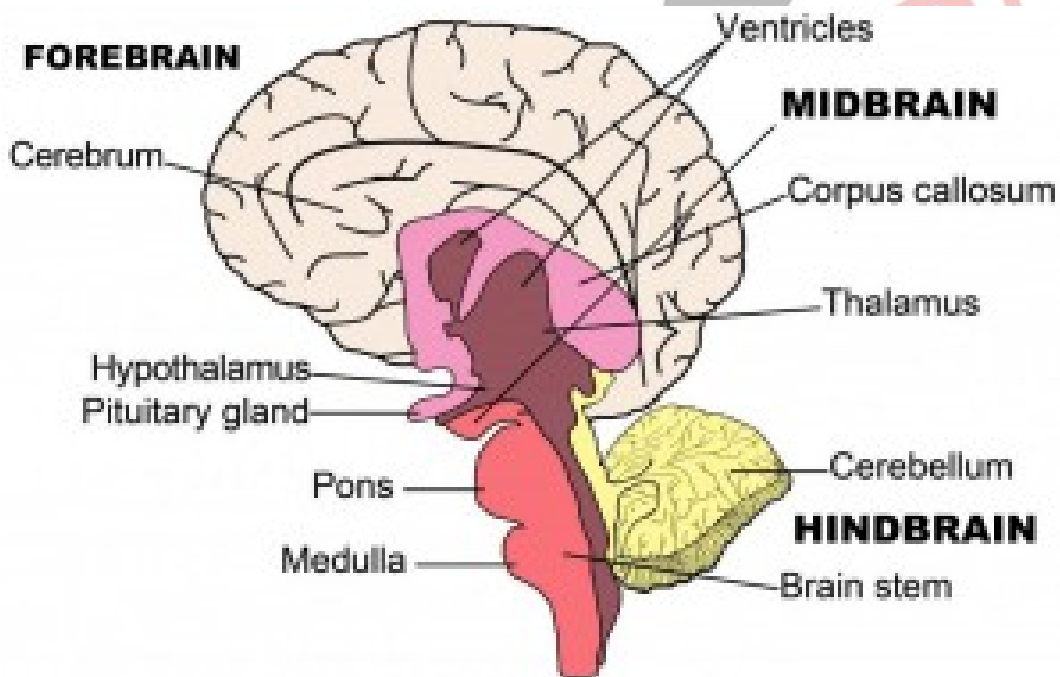
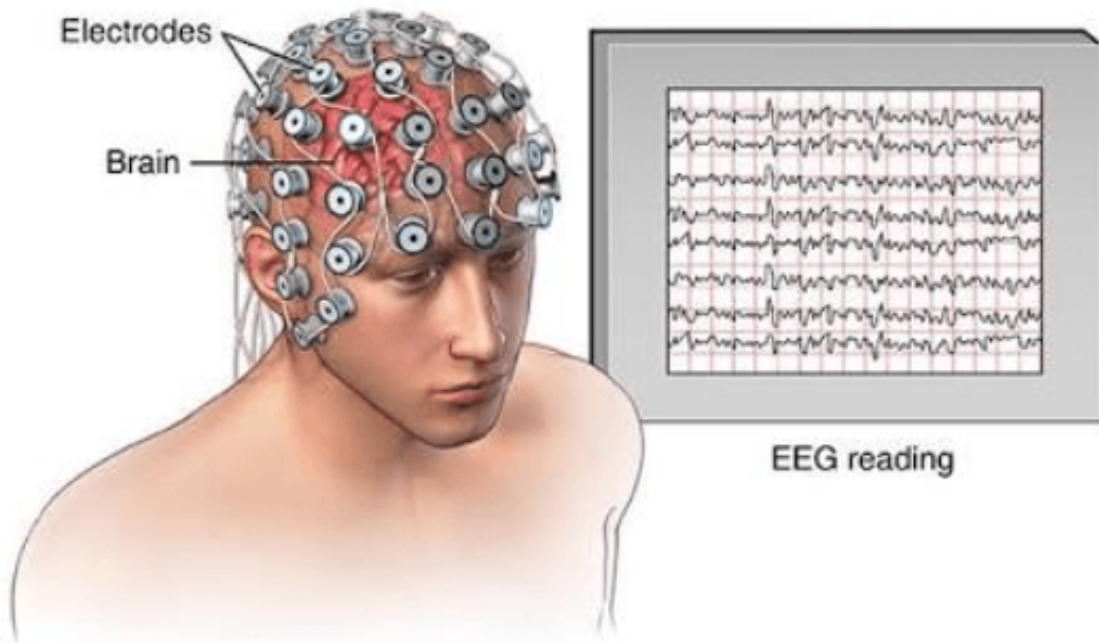
### ▪ Applications:

- It is the best test available to diagnose **epilepsy** (a neurological condition involving the brain that makes people more susceptible to having recurrent unprovoked seizures).
- An EEG test can also reveal the effects of **anaesthesia**, sleeping patterns, neurological activity during a coma, and availability of oxygen.
- EEG can also help **confirm brain death**.
- Also used for neuroscience, cognitive psychology, neurolinguistics, and neuromarketing studies and to develop **brain-computer interfaces**.
- Researchers have linked EEG data to various brain activities, distinguishing effectively between normal and abnormal states.

### ▪ Challenges:

- EEG is great at tracking rapid brain activity in milliseconds but is **biased towards signals from the brain's surface** and dendrites, making pinpointing activity origin complex.
- Researchers use EEG with **MRI** and advanced methods to overcome these challenges.

## Electroencephalogram (EEG)



## EEG And Other Similar Technologies

Feature	EEG (Electroencephalography)	fMRI (functional Magnetic Resonance Imaging)	PET Scan (Positron Emission Tomography Scan)	MEG (Magnetoencephalography)
<b>What it measures</b>	Electrical activity of neurons	Blood flow changes in the brain	Metabolic activity of brain cells	Magnetic fields generated by electrical currents in the brain
<b>Safety</b>	Safe, non-invasive	Safe, non-invasive (with contrast)	Requires low-dose radiation	Safe, non-invasive

		some limitations)	exposure	
<b>Cost</b>	Relatively inexpensive	Very expensive	Expensive	Expensive
<b>Portability</b>	Portable, can be used in various settings	Not portable, requires a large scanner room	Not portable, requires a specialized scanner	Somewhat portable, requires a magnetically shielded room
<b>Applications</b>	Epilepsy diagnosis, sleep studies, brain function monitoring	Studying brain function during tasks, brain mapping	Identifying metabolic changes associated with diseases, cancer detection	Studying brain function and epilepsy localisation

Read More: [MRI](#)

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### ***Prelims:***

**Q. With reference to Visible Light Communication (VLC) technology, which of the following statements are correct? (2020)**

1. VLC uses electromagnetic spectrum wavelengths 375 to 780 nm.
2. VLC is known as long-range optical wireless communication.
3. VLC can transmit large amounts of data faster than Bluetooth.
4. VLC has no electromagnetic interference.

**Select the correct answer using the code given below:**

- (a) 1, 2 and 3 only  
 (b) 1, 2 and 4 only  
 (c) 1, 3 and 4 only  
 (d) 2, 3 and 4 only

**Ans: (c)**

**Q. With reference to 'Near Field Communication (NFC) Technology', which of the following statements is/are correct? (2015)**

1. It is a contactless communication technology that uses electromagnetic radio fields.
2. NFC is designed for use by devices which can be at a distance of even a metre from each other.
3. NFC can use encryption when sending sensitive information.

**Select the correct answer using the code given below:**

- (a) 1 and 2 only  
 (b) 3 only  
 (c) 1 and 3 only  
 (d) 1, 2 and 3

Ans: (c)

PDF Refernece URL: <https://www.drishtiias.com/printpdf/electroencephalography-eeeg>

