

28– 08 – 2024

News: Electroencephalography (EEG)

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

Electroencephalography (EEG)

- Electroencephalography (EEG) stands for ‘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 are 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

- EEG 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.

Comparison with other technologies

Feature	EEG	MRI	PET Scan	MEG
Measures	Electoral activity of neurons	Blood flow changes in the brain	Metabolic activity of brain cells	Magnetic fields generated by electrical currents in the brain
Safety	Safe, non-invasive	Safe, non – invasive (with some expectations)	Low dose radiations exposures	Safe, non-invasive

Cost	Inexpensive	Expensive	Expensive	Expensive
Portable	Portable	Not Portable	No	Somewhat
Use	Epilepsy diagnosis, Sleep Studies and brain function monitoring	Studying brain function during tasks, brain mapping	Identifying metabolic changes associated with diseases, cancer detection	Studying brain function during tasks, epilepsy localisation

