



Electroencephalography (EEG) for Epilepsy

What is Electroencephalography (EEG)

Electroencephalography (EEG) for epilepsy is a specialized application of EEG, a non-invasive neuroimaging technique that is pivotal in diagnosing and monitoring epilepsy, a neurological disorder characterized by recurrent seizures. EEG specifically aims to record and analyze the electrical activity in the brain to detect abnormal patterns and pinpoint the location of epileptic foci, aiding in the diagnosis and management of epilepsy.

How Does EEG for Epilepsy Work?

- **Electrode Placement:** Small metal electrodes are strategically placed on the scalp using a standardized method like the international 10-20 system to record electrical signals from the brain.
- **Recording:** The EEG machine amplifies and records the electrical signals detected by the electrodes. The signals are typically recorded continuously for a set period, often during rest and sometimes during specific tasks to provoke potential abnormal brain activity.
- **Interictal Recordings:** EEG captures the brain's electrical activity in between seizures (interictal period) to identify abnormal brainwave patterns that may indicate the presence of epileptic foci. **Ictal Recordings:** In some cases, EEG is performed during a seizure (ictal period) to precisely locate the origin of the seizure within the brain.

Video EEG: Combined with video monitoring, this allows the correlation of the recorded electrical activity with the patient's behavior, providing crucial information for diagnosis.

Applications of EEG:

Diagnosis and Classification of Epilepsy: EEG is a fundamental tool for diagnosing epilepsy by identifying characteristic electrical patterns during interictal and ictal states. It also aids in classifying the type of epilepsy a patient may have.

Localization of Epileptic Foci: EEG helps in identifying the specific regions of the brain where epileptic activity originates, which is crucial for surgical planning to remove or treat the epileptic focus.

Monitoring Epileptic Activity: Continuous EEG monitoring is often employed to monitor and analyze brain activity over an extended period, helping to adjust medications and evaluate treatment efficacy.

Assessing Seizure Triggers: EEG can be used to investigate potential triggers for seizures, aiding in lifestyle modifications to minimize seizure occurrences.

Advantages of EEG:

Localization of Epileptic Foci: EEG is highly effective in localizing the specific brain regions generating epileptic activity, enabling targeted treatments and potentially surgical intervention.



Sensitivity to Abnormalities: EEG is very sensitive to abnormal electrical activity, allowing for early detection of abnormal brainwave patterns associated with epilepsy.

Non-Invasive: EEG is a non-invasive and safe procedure, making it suitable for repeated testing and monitoring, even in children and individuals with epilepsy.

Limitations of EEG for Epilepsy:

Limited Spatial Resolution: EEG has limited spatial resolution, making it challenging to precisely locate the epileptic foci within the brain, especially in cases where the focus is deep-seated.

False Negatives: EEG may not always detect abnormal activity, especially if the epileptic focus is in a region that is not well-captured by scalp electrodes.

Dependency on Patient State: The recorded EEG can be influenced by the patient's state (awake, asleep, sedated), potentially affecting the accuracy of the results.

References

American Epilepsy Society. (n.d.). Electroencephalogram (EEG). Retrieved from <https://www.aesnet.org/patients/what-is-epilepsy/diagnosis/eeg>

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