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Teaching the 6 Criteria of the International Federation of Clinical Neurophysiology for Defining Interictal Epileptiform Discharges on EEG Using a Visual Graphic

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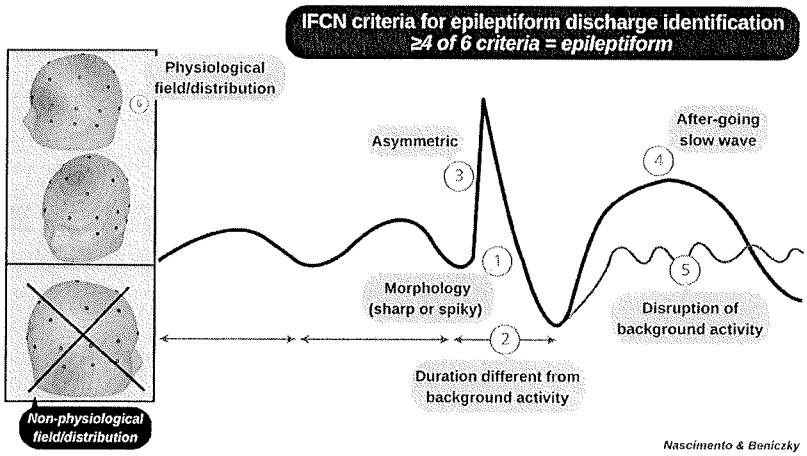
Figure Teaching Image Displaying the 6 Criteria of the IFCN for Identifying Interictal Epileptiform Discharges on EEG



(1) Sharp or spiky morphology (20–200 milliseconds); (2) different wave duration than background activity; (3) waveform asymmetry; (4) after-going slow wave; (5) disruption of background activity: flattening or low-voltage alpha or beta frequency activity after (most frequently) or before sharp transient; (6) distribution suggestive of cerebral source/physiologic field. Criteria 4 and 5 are independent. IFCN = International Federation of Clinical Neurophysiology.

The 6 operational criteria for defining interictal epileptiform discharges (IEDs) proposed by the International Federation of Clinical Neurophysiology simplify IED identification into a series of systematic feature extraction tasks. The presence of at least 4 criteria defines a sharp transient as epileptiform.[1] The criteria displayed in the teaching graphic (Figure) can be used to train novice EEG readers how to critically appraise the components of a sharp transient.[2,3] The visual-based, systematic teaching method ensures that trainees can accurately and reliably identify IEDs on EEG.[4] We use this graphic to teach the criteria to trainees and as a visual aid when applying the criteria during supervised EEG reading sessions.

Author Contributions

F.A. Nascimento: drafting/revision of the manuscript for content, including medical writing for content; major role in the acquisition of data; study concept or design; analysis or interpretation of data. S. Beniczky: drafting/revision of the manuscript for content,

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A revised glossary of terms most commonly used by clinical electroencephalographers and updated proposal for the report format of the EEG findings. Revision 2017

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This glossary includes the terms most commonly used in clinical EEG. It is based on the previous proposals (Chatrian et al., 1974; Noachtar et al., 1999) and includes terms necessary to describe the EEG and to generate the EEG report. All EEG phenomena should be described as precisely as possible in terms of frequency, amplitude, phase relation, waveform, localization, quantity, and variability of these parameters (Brazier et al., 1961). The description should be independent of the recording parameters such as amplification, montages, and computer program/display. Biological and technical artifacts that interfere with an adequate EEG interpretation should either be eliminated or, if this is not possible, be noted in the description.

The EEG report should follow a standard format that includes a factual description and a clinical interpretation of the EEG record. The interpretation of the EEG requires knowledge of the patient's age, past medical and medication history, their clinical condition during the EEG, particularly level of consciousness/vigilance and ability to co-operate. The EEG interpretation summarizes the results of the EEG and gives a clinical interpretation in light of the diagnosis and the questions posed by the referring physician. The terminology of the EEG interpretation should follow common neurological and clinical practice and use terms understandable to other physicians not specialized in EEG. A proposal for the EEG report form is given in Appendix A.

Glossary

Absence: A generalized seizure type. Use of term discouraged when describing EEG patterns. Terms suggested, whenever appropriate: spike-and-slow-wave complex, 3 c/s spike-and-slow-wave complex, sharp-and-slow wave complex.

Activation procedure: Any procedure designed to modulate EEG activity, for instance to enhance physiological waveforms or elicit abnormal paroxysmal activity. Examples include: eye closing, hyperventilation, photic stimulation, natural or drug-induced sleep, sensory stimulation (acoustic, somatosensory or pain).

Active sleep: Normal sleep stage in neonates characterized by eye closure, intermittent periods of rapid eye movements, irregular respirations and scant body movements. The EEG shows activité moyenne in term and near term infants, and tracé discontinue (discontinuous pattern) in preterm infants <34 weeks of post menstrual age (PMA); the inter-burst interval depends on the PMA. (See quiet sleep, activité moyenne, tracé discontinue, REM sleep).

Activity, EEG: An EEG wave or sequence of waves of cerebral origin.

Activité moyenne: Neonatal EEG pattern of wakefulness and active sleep in term and near term infants characterized by continuous, low to medium amplitude mixed frequency activity (25–50 μV) with a predominance of theta and delta and overriding beta activity. Synonym: mixed frequency activity. (See active sleep).

After-discharge: (1) EEG seizure pattern following single or repetitive electrical stimulation of a discrete area of the brain via cortical or intracerebral electrodes. (2) Burst of rhythmic activity following a transient such as an evoked potential or a spike.

Aliasing: Distortion of the EEG signal leading to misidentification of frequency, which occurs when the signal is sampled at less than twice the highest frequency present. The Nyquist theorem states that sampling rates should be at least twice the highest frequency, but accurate digitization of EEG signals requires even higher sampling rates. Comment: Distortion and aliasing can occur at the Nyquist theorem frequency (see Nyquist theorem, sampling rate).

Alpha band: Frequency band of 8–13 Hz inclusive. Greek letter: α.

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