Criteria for defining interictal epileptiform discharges in EEG
A clinical validation study

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Study objective and summary result
This study tested the hypothesis that clinicians can accurately identify EEG interictal epileptiform discharges (IEDs) based on the 6 sensor space criteria of the International Federation of Clinical Neurophysiology (IFCN) and a novel source space method, and the results showed that both methods are sensitive and specific tools for identifying IEDs.

Classification of evidence
Class III.

What is known and what this paper adds
The interpretation of EEG recordings typically depends on visual analysis, and this can lead to overinterpretation and misdiagnosis. This investigation’s results validate 2 methods that can reduce overinterpretation.

Participants and setting
The investigators obtained EEG recordings from 100 patients (60% female; median age, 31 years; age range, 2–89 years). Of these patients, 54 had epilepsy, and 46 had nonepileptic paroxysmal events. These patients underwent long-term video-EEG monitoring at 2 Danish centers between January 2012 and September 2017.

Design, size, and duration
The investigators relied on video-EEG recordings of the patients’ habitual clinical events to obtain reference diagnoses. The investigators asked 7 raters who had no access to non-EEG data to independently review the patients’ EEG sharp transients and classify them as epileptiform or nonepileptiform in 3 rounds. In 2 rounds, the raters reviewed the transients in sensor space and either scored them according to IFCN criteria or classified them without criteria-based guidance (i.e., expert scoring). In the remaining round, the raters reviewed and classified transients in source space.

Main results and the role of chance
Sensor space analyses with a 5-criteria cut-off achieved 81.48% sensitivity and 95.65% specificity. Source space analyses achieved 85.19% sensitivity and 95.65% specificity. Expert scoring achieved 90.74% sensitivity and 93.48% specificity.

Bias, confounding, and other reasons for caution
The present study did not include analyses of repetition patterns.

Generalizability to other populations
The underrepresentation of patients with generalized epilepsies in the present study’s sample may limit the generalizability of the results to such patients.

Study funding/potential competing interests
This study was funded by the Henry and Karla Hansen Foundation. Some authors report receiving personal fees from healthcare companies. Dr. Scherg is an employee and shareholder of BESA GmbH. Go to Neurology.org/N for full disclosures.

Figure Infographic summarizing the IFCN criteria: wave with (1) pointed peak; (2) different wave-duration than background; (3) asymmetric; (4) followed by a slow-wave; (5) background activity disrupted; (6) voltage map suggesting a source in the brain.
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