

## CLINICAL VALIDATION STUDY

### Is automated interictal epileptiform discharge detection sufficient to diagnose epilepsy from overnight EEG?

*Pieter van Mierlo, Serge Vulliémoz, Vincent Keereman, Gregor Strobbe, Margitta Seeck*

In clinical practice, the detection of interictal epileptiform discharges (IED) in overnight EEG is the hallmark to diagnose epilepsy. Nevertheless, visual analysis to identify the IEDs is a labor-intensive, objective and time consuming task. In this study, we investigate the usefulness of automated IED detection to aid in the diagnosis of epilepsy.

Fifty-seven patients had an overnight EEG recording of approximately 17h (3pm–8am) at the University Hospital of Geneva, Switzerland. Epilepsy diagnosis based on visual inspection of the EEG, performed by expert electrophysiologist (MS), was compared to diagnosis based on the automatically detected IEDs that were summarized in a concise report (Epilog Diagnostic, Epilog NV, Belgium). In the report the average IED clusters, their topography, the detections over time and 20 examples of single spikes were depicted. A blinded expert electrophysiologist (SV) reviewed the patients solely based on the reports by indicating whether the report showed genuine epileptic spikes in each patient or not, and thus whether the patient was diagnosed with epilepsy or not. The reviewer did not receive any clinical information about the patient. We assessed the correspondence between the labor-intensive visual diagnosis and the diagnosis based on the generated reports.

The **interpretation** of the report took the expert electrophysiologist approximately **5 min per report**. The expert electrophysiologist indicated that in 43 out of 57 patients (75%) a decision could be made solely based on the concise report. In 14 remaining patients, an extra look at the long-term recordings was advised. In the 43 patients the **sensitivity** to diagnose epilepsy was **83%**, while the **specificity** was **94%**. The **positive predictive value** was **83%** and **negative predictive value 94%**, which corresponds to a diagnostic odds ratio of 72.

We showed that automated IED detection can aid in the diagnosis of epilepsy from overnight EEG. It can help the neurologists decrease the time spent for visual analysis of the EEG.

#### Questions?

Contact Michel Kerger  
+32 475 51 52 92  
michel@epilog.care

#### Ghent Office

Vlasgaardstraat 52  
9000 Gent  
Belgium  
info@epilog.care  
+32 484 77 76 51