COMMENTARY

Using algorithm-based data reduction, temporal lobe seizures in super long-term subcutaneous EEG can be identified.

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ABSTRACT

A seizure, also referred to as an epileptic seizure, is a period of symptoms brought on by abnormally high or synchronized neuronal activity in the brain. The visible symptoms range from uncontrollable shaking movements involving a large portion of the body and loss of consciousness (tonic-clonic seizure), to controlled shaking movements involving only a small portion of the body and varying degrees of consciousness (focal seizure), to a subtle momentary loss of awareness (absence seizure). These episodes typically last less than two minutes, and it takes some time for things to get back to normal. It's possible to lose bladder control.

Key Words: *Focal seizure*

INTRODUCTION

Both provoked and unprovoked seizures are possible. Provoked seizures are those that are brought on by a transient occurrence such low blood sugar, alcohol withdrawal, drug abuse while also abusing alcohol, low blood sodium, fever, brain infection, or concussion. Unprovoked seizures take place without a known or treatable cause, making repeated seizures likely. Stress or lack of sleep may make unprovoked seizures worse. The term "epilepsy" refers to a brain condition where there has been at least one unannounced seizure and when there is a high chance of future seizures. Fainting, non-epileptic psychogenic seizures, and tremor are among the conditions that mimic epileptic seizures but are not epileptic convulsions.

As an alternative to self-reported epileptic seizure diaries, ultra-long-term monitoring with Subcutaneous EEG (sqEEG) provides objective outpatient recording of electrographic seizures. In order to cut down on the time spent on visual review; this methodology needs algorithm-based automatic seizure detection to flag times of possible seizure activity. This study's goal was to assess the effectiveness of an automatic seizure detection system based on sqEEG.

The main epilepsy symptom is seizures. The goal of clinical care is to prevent seizures and minimize side effects. People with refractory epilepsy face severe difficulties due to repetitive seizures, which may result in lifestyle restrictions and seizure-related damage. The burden of individuals with epilepsy must be accurately documented, however the current standard assessment utilizing seizure diaries based on self-reports by PWE or careers has been demonstrated to be incorrect with an average accuracy below 50%. More precise techniques are required because seizure quantification is the cornerstone of the clinical management of refractory epilepsy and the evaluation of novel medicines. The use of mobile devices for objective and precise seizure monitoring during routine activities is likely to revolutionize how patients with epilepsy are managed.

The cornerstone in the diagnosis of any epileptic syndrome is the EEG, which exhibits well-described features associated with epileptic seizures. As a result, numerous seizure detection methods for EEG, particularly for scalp EEG, have been developed. While scalp electrodes are impractical for lengthy recordings, minimally invasive subcutaneous EEG recording devices offer consistent, ultra-long-term continuous monitoring in the familiar surroundings and during routine activities for patients. For nine PWE with temporal lobe epilepsy, very long-term outpatient sqEEG monitoring has been shown to be feasible and well-tolerated. None of the PWE thought their ability to engage in their employment and leisure activities was restricted, and no major adverse events were noted. Additionally, it was shown that sqEEG can reliably identify electrographic seizures in

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actual environments. The sqEEG signal has also been shown to be of very good quality and stability across months of recording.

Where regular routine video-EEG and hospitalization at epilepsy monitoring units are insufficient, ultra-long-term outpatient sqEEG monitoring meets the needs. This includes the capacity to record uncommon seizures as well as the temporal variations in seizure patterns that are present in the majority of PWE. It is well recognized that seizure timing patterns, including both circadian and multi-day cyclic patterns, do not occur at random. When seizure cycles are known, ultra-long-term recordings could enhance the monitoring of treatment effects by removing the impact of high seizure occurrence variability.

Reviewers analysing seizure-annotated sqEEG traces in the second review phase most likely produced a confirmation bias.

Since the evaluation procedures varied, it was impossible to make direct comparisons. However, comparing the review teams and estimating inter-team differences were not the main objectives. Instead, the objective was to create the best labelled dataset and electrographic seizure gold standard. Applying various review procedures helps with this. By calculating the number of raters who agreed to classify each electrographic seizure as acceptable by a majority vote, a degree of agreement was nonetheless determined. All electrographic seizures for two PWE and all but one electrographic seizure for four PWE were accepted by three raters, whereas 13 of 24 electrographic seizures for one PWE were noted by all three raters. The sqEEG included short interictal rapid discharges with lengths ranging from 4 to 10 s for this latter PWE. The raters appeared to be uncertain about the length of the seizures and the BIRDs.