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INTERICTAL SCALP FAST OSCILLATIONS AS A MARKER OF THE SEIZURE ONSET ZONE

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Andrade-Valenca et al.[1] propose a promising method for localizing the seizure onset zone (SOZ) in scalp EEG recordings. The methods are accessible for implementation in most EEG laboratories. Critically, when the SOZ is ill-defined on scalp recordings, ripples may help guide intracranial electrode placement; in the future they may sometimes circumvent the need for such electrodes. Because certain filter parameters can sometimes result in spurious high frequency oscillations,[2] laboratories trying to reproduce these results will need the unstated filter settings used by the authors.

The authors show examples of the ripples and artifacts prior to filtering, which suggest proper settings were chosen. Three of their patients were evaluated with scalp and intracranial recordings, showing agreement between the SOZ in each. Given that prior studies of ripples were performed with depth electrode recordings, it is unfortunate that those data were excluded from the present study.

We look forward to reading more about that data, which would link prior studies to the present conclusions, in the near future. The next important steps are determining the relationship between scalp recorded ripples and surgical outcome, and perhaps to automating the method to increase interrater reliability.[3]

Author Response: Jean Gotman, Montreal; Luciana Andrade-Valenca, Pernambuco, Brazil; Rina Zelmann, Francois Dubeau, Montreal: Goldenholz et al. asked about our filter, which is a Finite Impulse Response filter of order 63. They also inquired about the relationship between scalp HFOs and those recorded in intracerebral electrodes. This is a complex problem for 2 reasons. First, we do not have simultaneous scalp and intracerebral recordings. Secondly, intracerebral electrodes record from a small brain volume and it is unlikely that HFOs seen at one intracerebral contact could be visible on the scalp. As we discussed,[1] HFOs visible on the scalp may come from rare HFOs that occur synchronously over a relatively large area (3 or 4 cm^2). We are currently analyzing simultaneous scalp and subdural recordings to further understand the relationship between intracerebral and scalp signals. Finally, Goldenholz et al. mention the need for automatic detection of scalp-recorded high frequencies. We refer them to our recently published method.[4] We hope that HFOs may become a marker of the epileptogenic zone[5] and a marker of developing epileptogenesis after an initial brain injury.

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