Epilepsy Research 72 (2006) 80–81

Epilepsy Research

www.elsevier.com/locate/epilepsyres

Discussion

Comment on: “Performance of a seizure warning algorithm based on the dynamics of intracranial EEG”

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Accepted 26 June 2006
Available online 21 August 2006

With great interest we read the article of Chaovalitwongse et al. (2005) concerning the performance of an automated seizure warning system (ASWS) based on concepts from nonlinear dynamics. To assess the performance of their algorithm, the authors divided long-term intracranial EEG data from 10 patients into training and test data sets. For the training data, the authors reported a high prediction performance with an average sensitivity of 76.12% accepting an average false prediction rate of 0.17 false warnings per hour. For the test data, an average sensitivity of 68.75% and an average false prediction rate of 0.15 were obtained.

These promising results nurture the hope to establish a therapeutic device for epilepsy patients based on an in-time seizure warning. However, seizure prediction suffers from the intrinsic problem that high sensitivities can always be achieved if a long interval for the occurrence of the seizure after the prediction, referred to by the authors as “prediction horizon”, is admitted. In such a case, also a random predictor using no information from the EEG yields a high sensitivity. Thus, the superiority of a prediction algorithm over the spurious predictive power of a random predictor has to be established. The sensitivity of a random predictor is given patient-individually by (i) the prediction horizon, (ii) the false prediction rate, and (iii) the number of seizures investigated (Schelter et al., 2006).

Comparing the reported sensitivities with the sensitivities of a random predictor based on a prediction horizon, the false prediction rates and the number of seizures per patient as reported reveals that for the training data the results for half of patients are superior to a random predictor. For the test data, the results for 8 out of 10 patients cannot be considered superior to a random predictor. Patient-individual results are displayed in Fig. 1. Moreover, taking into account the true predictions and false prediction rates as reported, 77% of

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doi:10.1016/j.eplepsyres.2006.06.012

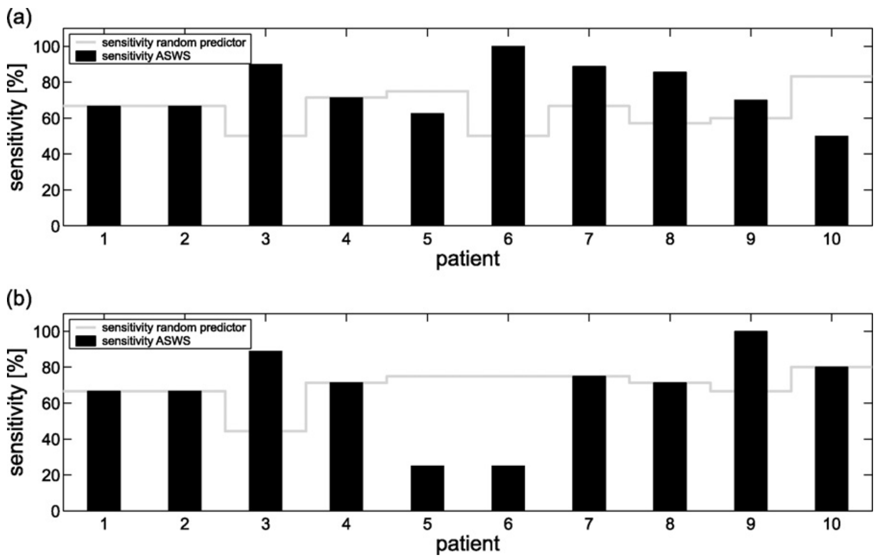

Fig. 1. Sensitivities for the automated seizure warning algorithm (Chaovalitwongse et al., 2005) and for a random predictor. (a) *Training data*: sensitivities for 5 out of 10 patients are superior to a random predictor. (b) *Test data*: sensitivities for 2 out of 10 patients are superior to a random predictor.

all predictions are false predictions for the training data and 68% for the test data.

Based on the comparison with a random predictor, the promising results reported by Chaovalitwongse et al. (2005) have to be put in perspective. We would like to point out that reporting performance without a proper assessment of the impact of the false prediction rate and the prediction horizon may raise an unjustified optimism that could undermine the credibility of the field of seizure prediction.

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