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## Prediction of epileptic seizures by analyzing brain waves

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A team of physicists, physicians and neuroscientists at the Bernstein Center of the University Freiburg did a step forward towards the ambitious goal of predicting epileptic seizures, as published in the latest issue of the journal "Epilepsia".

Professor Andreas Schulze-Bonhage, head of the Epilepsy Center at the University Hospital Freiburg: "Unfortunately, a considerable fraction of all epilepsy patients do not respond well to commonly used pharmaceuticals. For these patients, an automatic prediction of their suddenly occurring seizures would offer great benefit – they could prepare for the epileptic attack, for example by taking fast-acting medicine."

The scientists work on possibilities to detect pre-seizure changes in the brain. "In recent years, several methods were developed to calculate predictive features from the electroencephalogram, which measures brain waves", says Professor Jens Timmer, physicist at the Freiburg Institute for Advanced Studies (FRIAS). Yet, for individual prediction methods no satisfactory performances could be observed up to now. Within the framework of the European Union funded project "EPILEPSIAE", the research team studied whether a combination of different prediction methods could help to improve prediction performances. To this aim, a warning is given only if two methods trigger alarms during a short interval of time.

The study was based on the registrations of the electroencephalogram from eight patients, measured directly at the cortex. On average for all patients, the combination of methods yielded an increase in prediction performance by more than 50 %, proving the approach to be auspicious. "In our study, about every second seizure could be predicted correctly", says Hinnerk Feldwisch-Drentrup from the Bernstein Center Freiburg. "While it is better than a random prediction, in the current state it seems not just yet to be sufficient for real clinical applications." In order to investigate further possible improvements, the scientists compiled an extensive database of EEG recordings from currently 200 patients, together with partners in

France and Portugal. Additionally, real-time applications of their methods are planned to be studied in the near future.

- **Full bibliographic information**Reference: H. Feldwisch-Drentrup, B. Schelter, M. Jachan, J. Nawrath, J. Timmer, A. Schulze-Bonhage. Joining the benefits: Combining epileptic seizures prediction methods. *Epilepsia* 51, 2010, 1598-1606.

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