



Asian Journal of Scientific Research

ISSN 1992-1454

science
alert
<http://www.scialert.net>

ANSI*net*
an open access publisher
<http://ansinet.com>

Attempting to Predict Epileptic Seizure

While the causes of epileptic seizures continue to confound brain researchers, scientists have been exploring how changes in the coordinated activity of brain networks, as monitored through electrodes, might help predict impending seizures. A report in the American Institute of Physics' journal Chaos offers new insight into this possibility.

Two properties are commonly used to measure fluctuations in the activity of a brain network; one, known as L, relates to the overall connectedness between the activities of brain regions (or nodes), and the other, C, represents the probability that any two nodes are both interacting with a third node. Tracking changes in these variables, neuroscientists suspect, might offer a way to spot seizures in advance.

Most studies of complex brain networks have used only short-duration recordings of brain function, no more than a few minutes long. And, says physicist Marie-Therese Kuhnert -- a graduate student at the University of Bonn and first author of the CHAOS paper -- to really find seizure-predicting patterns, you need longer-term data.

Kuhnert and her colleagues, professors Christian Elger and Klaus Lehnertz, studied the brain recordings of 13 epilepsy patients undergoing pre-surgical evaluations. The data -- representing, in all cases, days of continuous recordings and

seizure activity -- did indeed show fluctuations in L and C, but the two measures were "strongly influenced by the daily rhythms of the patient, sleep-wake cycles, and alterations of anticonvulsive medication," Kuhnert says. Upcoming seizures and even seizures themselves had little effect.

Surprisingly, Kuhnert and her colleagues found much more regularization of brain network activity at night. Previously, such regularization has been seen in healthy individuals, but never in epilepsy patients. "It remains to be investigated whether the increased regularization at night is causally related to epilepsy, whether it requires some treatment, or whether it can be regarded as a seizure-preventing mechanism," she says.

Marie-Therese Kuhnert, Christian E. Elger, Klaus Lehnertz. Long-term variability of global statistical properties of epileptic brain networks. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 2010; 20 (4): 043126 DOI: 10.1063/1.3504998