# Researchers find possible biomarker to identify seizure-related stress

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New research from Rhode Island Hospital found that reduced levels of brain-derived neurotrophic factor (BDNF), a protein in the brain that encourages growth of neurons, may be a trait marker for individuals with psychogenic non-epileptic seizures (PNES) (seizures that are psychological in origin). The findings are published in the October 4, 2010, issue of *Neurology*, the medical journal of the American Academy of Neurology.

Past studies have shown decreased levels of BDNF in the serum of patients with psychiatric disorders such as major depressive disorder and conversion disorders (a condition in which a patient displays neurological symptoms such as numbness or seizures when no neurological lesion or pathology is found). Children with epilepsy have been found to have increased levels of BDNF compared to healthy controls. Serum BDNF levels, however, have not been investigated in adult patients with epileptic seizures (ES). With this in mind, researchers from Rhode Island Hospital hypothesized that BDNF would differentiate between ES and PNES.

W. Curt LaFrance, Jr., MD, MPH, director of neuropsychiatry and behavioral neurology at Rhode Island Hospital, and assistant professor of psychiatry and neurology (research) at The Alpert Medical School of Brown University led the study of three groups of patients -- one group with confirmed PNES, one group with ES and one healthy control group. The patients were also screened for comorbid depression as well, as past studies have suggested that chronic antidepressant use increases serum

BDNF in patients with depression. More than half (8 of 13) of the patients in the PNES group were diagnosed with mild depression and were taking psychotropic (antidepressant) medication.

LaFrance and his fellow colleagues from Brown University found decreased levels of serum BDNF in both the PNES and ES groups when compared to the healthy control group. They believe these findings are significant in that it would be expected that the PNES patients taking antidepressant medications would have an increased level of serum BDNF. There were no significant differences in the levels of serum BDNF among all the patients in the PNES group, whether they were taking antidepressants or not. As a result, they believe that the reduced levels of BDNF may be a biomarker for PNES.

LaFrance says, "While BDNF may play a similar role in the pathophysiology of depression and PNES, the differential response of serum BDNF to antidepressants in patients with psychogenic nonepileptic seizures could highlight an important difference. The fact that antidepressants did not increase serum BDNF levels in our study and that there were no BDNF differences between patients with PNES who were depressed and those who did not have depression would suggest that serum BDNF might represent a trait marker of PNES. This could potentially be useful in understanding the pathophysiology of conversion disorders."

The study also found decreased levels of BDNF in adult patients with epileptic seizures, unlike the elevated levels found in children with ES. LaFrance comments, "This result is unexpected given the findings of elevated serum BDNF levels in children and the studies investigating BDNF concentrations in adult patients with ES."

LaFrance noted, "A model that may provide a unifying hypothesis on the decreased serum BDNF findings in both seizure groups may not be

related to seizures -- it may be related to stress. Stress has been shown to lower BDNF, and a shared characteristic of patients with epilepsy or with nonepileptic seizures is fear of the next seizure. There may be great potential for biomarkers for PNES and for treatment response." Based on these findings, LaFrance and his colleagues propose that additional studies of BDNF levels take place to provide further insight into the role of BDNF in seizure disorders.

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