

Novel compounds arrested epilepsy development in mice

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Generalized 3 Hz spike and wave discharges in a child with childhood absence epilepsy. Credit: Wikipedia.

A team led by Nicolas Bazan, MD, PhD, Boyd Professor and Director of LSU Health New Orleans' Neuroscience Center of Excellence, has developed neuroprotective compounds that may prevent the development of epilepsy. The findings will be published online in *Scientific Reports*, a Nature journal, on July 22, 2016.

In this study in an experimental model of [epilepsy](#) in mice, the [compounds](#) prevented seizures and their damaging effects on [dendritic spines](#), specialized structures that allow brain cells to communicate. In epilepsy, these structures are damaged and rewire incorrectly, creating brain circuits that are hyper-connected and prone to seizures, an important example of pathological plasticity.

"In the current study, preservation of dendritic spines and subsequent protection from seizures, were observed up to 100 days post-treatment, suggesting the process of epilepsy development has been arrested," notes Dr. Nicolas Bazan, Director of the LSU Health New Orleans Neuroscience Center of Excellence.

Dr. Bazan and Professor Julio Alvarez-Builla Gomez, a medicinal chemist from the University of Alcala in Spain, discovered and patented the LAU compounds, named for the inventors in Louisiana and the Spanish university. A number of LAU compounds were studied in this research, which blocked a neuroinflammatory signaling receptor, protecting dendritic spines and lessening seizure susceptibility and onset, as well as hyper-excitability.

According to the National Institutes of Health, the epilepsies are a spectrum of brain disorders ranging from severe, life-threatening and disabling, to ones that are much more benign. In epilepsy, the normal pattern of neuronal activity becomes disturbed, causing strange sensations, emotions, and behavior or sometimes convulsions, muscle spasms, and loss of consciousness. It is not uncommon for people with

epilepsy, especially children, to develop behavioral and emotional problems in conjunction with seizures. Issues may also arise as a result of the stigma attached to having epilepsy, which can lead to embarrassment and frustration or bullying, teasing, or avoidance in school and other social settings. For many people with epilepsy, the risk of seizures restricts their independence (some states refuse drivers licenses to people with epilepsy) and recreational activities. Epilepsy can be a life-threatening condition. Some people with epilepsy are at special risk for abnormally prolonged seizures or sudden unexplained death in epilepsy. There is currently no cure.

The research team also included Drs. Alberto Muso, Suriyadipita Bhattacharjee, Ludmila Belayev and William Gordon from LSU Health New Orleans' Neuroscience Center of Excellence, Robert Rosencrans, Chelsey Walker, as well as and Chittalsinh M. Raulji, from LSU Health New Orleans' Department of Pediatrics Section of Hematology-Oncology, along with Zhide Fang, from the Biostatistics Program at LSU Health New Orleans School of Public Health.

The research was supported by the National Institute of General Medical Sciences of the National Institutes of Health. "Future clinical studies would evaluate the potential application of the compounds that we have developed and/or the mechanisms that we have discovered that are targeted by these compounds in the development of epilepsy," concludes Dr. Bazan. "Most of the anti-epileptic drugs currently available treat the symptom - [seizures](#)- not the disease itself. Understanding the potential therapeutic usefulness of compounds that may interrupt the development process may pave the way for disease-modifying treatments for patients at risk for epilepsy."

The research is part of an ongoing effort in Dr. Bazan laboratory to understand the critical role of brain plasticity which underlies many aspects of [health](#) and disease, from developmental disorders like dyslexia

to aging, retinal degeneration, neurotrauma (concussions, TBI), stroke, Parkinson's and Alzheimer's disease.

Provided by Louisiana State University

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