NEWS

Activity in cerebellum silences seizures in mice

BY **LAURA GEGGEL**

10 NOVEMBER 2013

Seizure city: Tottering mice carry a mutation in a channel that controls calcium levels, and have seizures that last less than a minute.

Activating cells in the cerebellum, a brain region usually associated with movement, eliminates seizures in a mouse strain that normally has hundreds of seizures a day, according to results presented Saturday at the **2013 Society for Neuroscience annual meeting** in San Diego.

So-called '**tottering mice**' have a mutation in a single base of the CACNA1A gene, which codes for a piece of a channel for calcium ions. These mice have absence seizures, which generally last less than a minute. In people, absence seizures typically only affect children and cease by adolescence.

CACNA1A is not linked to autism risk, but genes in the same family, including **CACNA1B** and **CACNA1C**, may increase risk for the disorder.

There is little data linking the cerebellum to absence seizures, the researchers say. However, the cerebellum is in a prime location to mediate activity from the thalamo-cortical networks, which have been implicated in absence seizures, says Lieke Kros, a graduate student in **Freek Hoebeek**'s lab at Erasmus Medical Center in Rotterdam in the Netherlands.

The results are "very nice," says **Vincenzo Crunelli**, professor of neuroscience at Cardiff University in Wales, U.K., who was not involved in the study. "It's probably one of the first

demonstrations of cerebellar involvement in absence epilepsy."

The researchers measured the electrical activity of neurons in the cerebellum. They also recorded activity in the cortex using an electroencephalogram to detect seizures. The animals were awake during the experiment so that anesthesia would not interfere with the readings, Kros says.

The recordings showed that a subset of neurons have more irregular firing patterns and more electrical bursts between seizures compared with other neurons.

Intrigued, the researchers used a chemical called muscimol to silence the neurons. Within an hour, they found a 15-fold increase in seizures in the treated mice compared with mice given a saline control.

"The mouse just goes crazy," Kros says. "We think that it disrupts the excitation and inhibition balance in thalamo-cortical networks so much that you get an increase in seizures."

The researchers then used a technique called optogenetics, which entails using light to activate subsets of neurons. Activating neurons in the cerebellum in this way completely stopped seizures in the mice, the researchers found.

For more reports from the 2013 Society for Neuroscience annual meeting, please ***click here****.*