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Important role for the cerebellum

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Hereditary diseases such as epilepsy or various coordination disorders may be caused by changes in nerve cells of the cerebellum, which do not set in until after birth. This is reported by Bochum's neuroscientists in the *Journal of Neuroscience*.

The team of Prof. Dr. Stefan Herlitze, the Chair of the Department of Zoology and Neurobiology at RUB, showed that the diseases broke out in mice if, a week after birth, they eliminated a particular protein in the cerebellum which regulates the influx of ions into nerve cells. "It's the first time that we have gained an insight into the origin of these diseases" said Prof. Herlitze. "We can now start conducting research to develop new therapeutic approaches."

Various forms of epilepsy, coordination disturbances (ataxias) and migraines are caused by mutations in the so-called P/Q-type calcium channel that controls the influx of calcium ions into the nerve cells of the brain. Dr. Melanie Mark from Prof. Herlitze's team developed an animal model in which this calcium channel could be deactivated at any time in a brain region of choice. The researchers focused on specific cells in the cerebellum (Purkinje cells) that coordinate the movements of the body. "The calcium channel is actually present throughout the entire brain", explains Dr. Mark. "It is the first time that we have been able to show that the diseases can be triggered by dysfunctional signal processing originating in the cerebellum."

With the aid of the new mouse model, the so-called Purky mouse, Prof. Herlitze's team is now investigating the molecular basis of the diseases

caused by changes in the P/Q-type calcium channel, in order to develop new therapeutic approaches. In cooperation with Prof. Dr. Timmann-Braun of the University Clinic in Essen and Prof. Dr. Klockgether of the University Clinic in Bonn, Bochum's neuroscientists want to compare their studies in the mouse model with results from patient studies. "We especially hope to help children suffering from absence epilepsy, i.e. epilepsy associated with a disturbance of consciousness", says Prof. Herlitze.

More information: M. Mark, T. Maejima, D. Kuckelsberg, J. Yoo, R. Hyde, V. Shah, D. Gutierrez, R. Moreno, W. Kruse, J. Noebels, and S. Herlitze: Delayed Postnatal Loss of P/Q-Type Calcium Channels Recapitulates the Absence Epilepsy, Dyskinesia, and Ataxia Phenotypes of Genomic Cacna1A Mutations. In: The Journal of Neuroscience 2011: 31; 4311 - 4326, doi:10.1523/JNEUROSCI.5342-10.2011

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