Researchers find a key mechanism in the development of nerve cells

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Chaos brews in the brains of newborns: the nerve cells are still bound only loosely to each other. Under the leadership of Academy Research Fellow Sari Lauri, a team of researchers at the University of Helsinki has been studying for years how a neural network capable of processing information effectively is created out of chaos. The team has now found a new kind of mechanism that adjusts the functional development of nerve cell contacts. The results were published in early September as the leading article of the esteemed *Journal of Neuroscience*.

The work carried out by Lauri's team and its partners at the Viikki campus sheds light on a development path that results in some of the large number of early synapses becoming stronger. The researchers found out hat the BDNF growth factor of nerve cells triggers a functional chain which promotes the release of the neurotransmitter glutamate. BDNF enables the release of glutamate by prohibiting the function of kainate receptors which slow down the development of the preforms of the synapses. The activity of the kainate receptors restricts the release of glutamate and the development of synapses into functional nerve cell contacts.

It is noteworthy that the brain of a newborn itself seems to organise its own development. The electrical activity of the waking brain triggers the series of events controlled by the BDNF protein, as a result of which kainate receptor activity disappears in some synapses. The development is based on the considerable plasticity of the developing neural network: it can reshape its structureand function to a large extent.

According to Lauri, the new research results help understand how central nervous system diseases originating in early development are established. The finding also provides researchers with the opportunity to obtain information about the different aspects of endogenous activity of the brain. At the same time, it could be possible to develop new kinds of pharmaceuticals for the treatment of childhood epilepsy, for example.

Lauri's team conducted the research in co-operation with the research teams of Eero Castren and Tomi Taira from the Neuroscience Centre, and the research team of Jari Yli-Kauhaluoma from the Faculty of Pharmacy.

Source: University of Helsinki