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Medizin
überregional**A gene activated in infant and young brains determines learning capacity in adulthood**

This week in the Proceedings of the National Academy of Sciences USA a research team from the University Medical Center Hamburg-Eppendorf (UKE) reports that there is a critical period in infant and young brains, when a specific gene needs to be activated to make complex learning in adulthood at all possible. The findings may have implications for child education and treatment of psychiatric disorders in which brain development was disturbed.

During early postnatal development, primary sensory regions of the brain undergo periods of heightened plasticity (critical period), which sculpt neural networks and lay the foundation for adult sensory perception. "If such critical periods exists for complex behavior has long been debated" says Dietmar Kuhl, director of the Institute for Molecular and Cellular Cognition at the Center for Molecular Neurobiology (ZMNH) of the UKE. "Our study shows that this is indeed the case. During a critical period in the development of the brain, the gene Arc/Arg3.1 is activated. It is responsible for establishing neuronal networks, which are required later for complex learning."

In previous work, Dietmar Kuhl and his team identified Arc/Arg3.1 and demonstrated its vital role in storing long lasting memories in adults. Animals lacking this gene exhibit Alzheimer-like loss of memory although they are otherwise perfectly healthy. In their new study, the Hamburg team discovered that Arc/Arg3.1 is also activated in the brains of infant and young mice. "These findings puzzled us, because mice of this age are not yet capable of forming long term memories", explains Ora Ohana, who codirected this study with Dietmar Kuhl. "We now could demonstrate that mice, which expressed the Arc/Arg3.1 gene during infancy and childhood, were capable of faster and more complex learning compared to mice, which lacked the gene during this critical period."

According to the scientists, the new findings will pave the way to understand how regulation of Arc/Arg3.1 by genetic, environmental factors, as well as experience during childhood can determine adult cognitive capacity. "This research will ultimately help to provide optimal environments for child-raising and better treatments for neuropsychiatric conditions in which brain development was disturbed", says Xiaoyan Gao, one of the authors of the study.

The Medical Center Hamburg-Eppendorf (UKE)

Since its foundation in 1889, the Medical Center Hamburg-Eppendorf (UKE) has been one of the leading clinics in Europe. With about 11,000 employees, the UKE is one of the largest employer in the Free and Hanseatic City of Hamburg. Together with its University Heart Center Hamburg and the Martini Clinic, the UKE has more than 1,730 beds and treats about 472,000 patients a year. The emphasis in UKE's research are the neurosciences, cardio-vascular research, care research, oncology, as well as infections and inflammations. Other potential areas of the UKE are molecular imaging and skeletal biology research. The UKE educates about 3,400 medical specialists and dentists. Knowledge, Research, Healing through Shared Competence: The UKE | www.uke.de

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