

Communication channels in the brain

Jakob von Engelhardt leads a new Junior Research Group, “Synaptic Communication and Neurodegeneration”, established by the German Center for Neurodegenerative Diseases (DZNE) at the German Cancer Research Center (DKFZ) with the aim of combining the competencies of the two institutes. Research topics of the group include the cellular foundations of learning and memory as well as the molecular causes of neurodegenerative diseases.

In the brain, a number of receptors for the glutamate neurotransmitter play a key role: They mediate communication between neurons and, thus, also control essential brain functions such as learning and memory. The receptors are protein channels located on the membranes of neuronal cells which bind glutamate and, as a result, open up to let sodium, potassium or calcium enter the cells. With his newly established working group, Dr. Jakob von Engelhardt will investigate, among other things, the role of these receptors in the pathogenesis of dementia caused by Alzheimer’s disease. Plaques made up of a protein called amyloid beta are believed to be among the causes of the destruction of the central nervous system in Alzheimer’s patients. However, scientists have come to the conclusion that it is not the insoluble plaques that cause the pathogenic changes but rather their precursors, soluble aggregates (“oligomers”) of amyloid beta molecules. Von Engelhardt’s group pursues studies with genetically engineered mice to find out whether such amyloid-beta oligomers interact with glutamate receptors and may thus exert their cytopathic effect.

A second focus of von Engelhardt’s research is the fine tuning of a certain type of glutamate receptor called AMPA receptor. The neuroscientist is studying the question of which proteins come into contact with the receptor and how this happens. These interactions determine the number, localization and function of AMPA receptors in the synapse and are therefore crucial for many cognitive processes.

Thirty-nine-year-old Jakob von Engelhardt studied medicine and started his neuroscience career at the University Hospital of Neurology in Heidelberg, where he pursued research at the Department of Clinical Neurobiology headed by Professor Hannah Monyer. In 2010, the department was turned into a collaborative department of Heidelberg University and DKFZ.

The German Center for Neurodegenerative Diseases (DZNE) was established in 2009 in the Helmholtz Association as the first of six German Centers for Health Research founded by the Federal Ministry for Education and Research. The DZNE comprises research groups based at nine sites across Germany. Jakob von Engelhardt leads the joint Junior Research Group of DKFZ and DZNE. The group is based at DKFZ in Heidelberg in order to collaboratively use highly specialized infrastructure such as for electrophysiological measuring methods and to combine competencies in the field of neuroscience.

A picture of Jakob von Engelhardt is available under:

<http://www.dkfz.de/de/presse/pressemitteilungen/2012/images/Jakob-von-Engelhardt.jpg>

Source: Brigitte Engelhardt, Deutsches Krebsforschungszentrum

The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) with its more than 2,500 employees is the largest biomedical research institute in Germany. At DKFZ, more than 1,000 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment

of cancer patients more successful. Jointly with Heidelberg University Hospital, DKFZ has established the National Center for Tumor Diseases (NCT) Heidelberg where promising approaches from cancer research are translated into the clinic. The staff of the Cancer Information Service (KID) offers information about the widespread disease of cancer for patients, their families, and the general public. The center is a member of the Helmholtz Association of National Research Centers. Ninety percent of its funding comes from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg.

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