

Press Release – Science

Leuven – 20 June 2005 (6pm)

Fruit fly helps reveal the secrets of the fragile-X-syndrome

Leuven – The fragile-X-syndrome is one of the major causes of mental retardation. Scientists from VIB (the Flanders Interuniversity Institute for Biotechnology), under the direction of Bassem Hassan (Catholic University of Leuven), have been studying fruit flies with symptoms similar to those in humans. From their research on these small flies, it turns out that something goes wrong with the actin skeleton of the neurons in the brain. This finding suggests that this process would also take place in human patients with the fragile-X-syndrome – an important step in uncovering the physical background of this disorder.

Mental retardation

The fragile-X-syndrome is the most common hereditary form of mental retardation and occurs much more often in boys than in girls. Children with the fragile-X-syndrome have certain characteristic features, such as a long face with a large chin, protruding ears, and a high forehead. As a child, they frequently have behavior problems and are sometimes hyperactive, agitated, and clumsy. They are usually mentally handicapped, but the degree of handicap differs from person to person. The behavior problems diminish with the onset of puberty, while the mental handicap remains.

A genetic cause

Since 1991, scientists have known which genetic alteration lies at the basis of the fragile-X-syndrome. This alteration causes the **FMRP protein** (Fragile X mental retardation protein, named after the syndrome) to lose its function. However, up to now, it has not been clear which bodily reactions are blocked by the loss of function of this one gene, given the fact that the FMRP controls the functioning of many other genes as well. Shedding light on this situation is one of the great challenges for researchers who want to better understand the syndrome and, consequently, the functioning and development of the brain.

Research on fruit flies

Bassem Hassan's group specializes in this area of research, using fruit flies because they contain the dFMRP protein, which is analogous to the human FMRP protein. Just like humans with the fragile-X-syndrome, fruit flies in which the dFMRP gene has been knocked out display behavior problems and disturbances in the brain. It is these modified flies that the research team in Leuven is using as their **model system**.

Actin and profilin

Their research has led to the discovery that fruit flies that produce no dFMRP in turn produce more profilin. Profilin, a protein, regulates the dynamics of **actin**, which has a very important function regarding the form and structure of all types of cells, including neurons. Actin acts as a kind of **scaffolding** that supports the cell and gives it shape. Too much profilin disturbs the regulation of actin, giving rise to abnormal neuron sub-divisions. The researchers found this clearly in the fruit flies that produce no dFMRP.

A new interaction revealed

With this research, **Bassem Hassan** and his group (Simon Reeve, Laura Bassetto, and Maarten Leyssen) are the first to demonstrate that dFMRP controls the regulation of the actin skeleton. In fruit flies that produce less or no dFMRP, this entire process goes awry and the neurons no longer form the correct patterns. This is probably also the case for humans, and so this research can lead to a better understanding of the fragile-X-syndrome, and also of the brain's development. Therefore, the researchers now propose to study this result, which they have obtained in fruit flies, in mice models. These mammals, of course, are a rung closer to humans on the evolution ladder.

Relevant scientific publication

The research of Bassem Hassan's group is being published on 20 June in the authoritative journal *Current Biology*. The publication can be found on:

www.eurekalert.org/jrnls/cell/pages/index.php or by sending an e-mail to: hhardman@cell.com

Attachment

Photo of the brain of a fruit fly. Red denotes actin, green and blue denote the neurons that the researchers have studied. The green neurons control the bio-rhythm, and the blue neurons control memory and learning.

Research funds

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Note to the Editor:

VIB, the Flanders Interuniversity Institute for Biotechnology, is a research institute where 850 scientists conduct gene technological research in a number of life-science domains, such as human health care and plant systems biology. Through a joint venture with four Flemish universities (Ghent University, the Catholic University of Leuven, the University of Antwerp, and the Free University of Brussels) and a solid funding program for strategic basic research, VIB unites the forces of nine university science departments in a single institute. Through its technology transfer activities, VIB strives to convert the research results into products for the benefit of consumers and patients. VIB also distributes scientifically substantiated information about all aspects of biotechnology to a broad public.

Given that this research can raise a lot of questions for patients, we ask you to please refer questions in your report or article to the email address that VIB makes available for this purpose: patienteninfo@vib.be. Everyone can submit questions concerning this and other medically-oriented research directly to VIB via this address.