New genetic marker makes fruit fly a better model for brain development and diseases

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Belgian researchers have improved the fruit fly as model for studying the connections between brain cells. The researchers developed a specific marker for a part of the fly's nerve cell which had previously been difficult to distinguish. Their discovery will not only contribute to gaining a better insight into brain development but also makes the fruit fly into a better model system for studying brain development and brain disorders.

The human brain is composed of 100 billion individual nerve cells which communicate with each other via a complex network of connections. Errors in communications of these cells are often at the basis of brain and nerve diseases such as Alzheimer's and multiple sclerosis. In the search for possible solutions to these diseases, one important aspect is to understand how the connections between nerve cells develop.

The fruit fly, *Drosophila melanogaster*, is an important, low-cost model organism with 60% genetic similarity with humans. The fruit fly plays a significant role in clarifying various neurological processes such as the way our memory works and our sense of smell and in studying particular neurodegenerative diseases. The team headed by Bassem Hassan uses the fruit fly as a model to study brain development.

Though *Drosophila* has long been used to study the connections between nerve cells, one specific marker was still missing. To understand the whole circuit between nerve cells, markers are needed for the different compartments of nerve cells (presynaptic or output cells and

postsynaptic or input cells).

Under the direction of Bassem Hassan and in collaboration with Wim Annaert, Laura Nicolaï, Ariane Ramaekers and their colleagues have identified the missing marker, DenMark (Dendritic Marker), a hybrid of a mouse protein and a fluorescent protein. The high specificity of such a marker for the input compartment of the nerve cells in *Drosophila* gives rise to hope that it can also be used in other model organisms.

Nerve cells communicate via a synapse. A synapse is a space in the connection between nerve cells, more specifically the space between the presynaptic membrane (of an axon) and the postsynaptic membrane (of a dendrite). Axons conduct away from the cell, dendrites (usually) to it. The "message is transmitted" via the synapse by neurotransmitters.

More information: Genetically encoded dendritic marker sheds light on neuronal connectivity in Drosophila - *PNAS* - Nicolaï et al. - www.pnas.org/content/early/2010/11/03/1010198107

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