Nano-motors facilitate communication between brain cells

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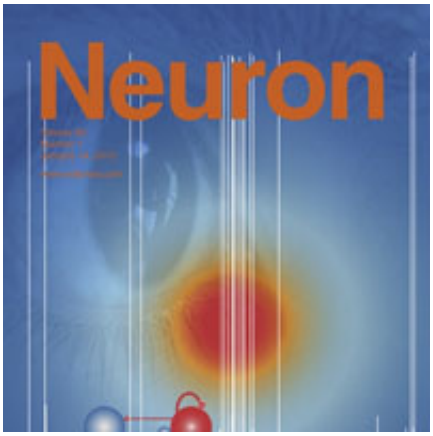

Dr Kittler's research is published in the 14 January issue of Neuron journal.

(PhysOrg.com) -- MRC-funded scientists led by Dr Josef Kittler (University College London Neuroscience) have identified how nano-sized motors in nerve cells help to regulate the balance of communication in the brain.

The findings may also help to explain why communication between nerve cells is disrupted in Huntington's disease, leading to altered electrical behaviour of nerve cells in this disease.

Nerve cells send signals to each other by releasing chemicals at specialized junctions between the cells called synapses. One key neurotransmitter, called GABA, acts on special proteins (GABA

receptors) to generate inhibition, which stops the brain from becoming too excitable. In a paper published this week in the journal Neuron, Dr Kittler reveals how a protein named HAP1, working together with molecular motor proteins, helps to guide the GABA receptors to the synapses.

Alison Twelvetrees first author on the study, said: “This work advances our understanding of how the GABA receptor proteins are delivered to synapses to control the level of inhibition in the brain. We show that the receptors are transported to synapses by small nanometer-sized motors, on intracellular protein tracks called microtubules”.

In the inherited neurological disorder Huntington’s disease, a mutation in the gene for the protein huntingtin leads to the production of a mutant huntingtin protein. This can disrupt several aspects of normal nerve cell function, including the function of the synapses. This altered function of synapses is likely to be an important contributor to the progression of the disorder.

Lead author Dr Josef Kittler said: “Our work shows how the transport of the GABA receptors to synapses is disrupted by the protein that is mutated in Huntington’s disease, and adds another piece to the complex puzzle of how synaptic communication in the brain gets disrupted in this disorder”.

The research is a good example of how understanding the way that tiny, but crucial, cell components such as synapses function contributes to understanding problems that affect whole body systems.

More information:

-- For more information about Dr Kittler’s research, please visit his webpage.

-- Research paper in *Neuron*: