Vitamin P as a potential approach for the treatment of damaged motor neurons

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Biologists from the Ruhr-Universität Bochum have explored how to protect neurons that control movements from dying off. In the journal *Molecular and Cellular Neuroscience* they report that the molecule 7,8-Dihydroxyflavone, also known as vitamin P, ensures the survival of motor neurons in culture. It sends the survival signal on another path than the molecule Brain Derived Neurotrophic Factor (BDNF), which was previously considered a candidate for the treatment of motoneuron diseases or after spinal cord damage.

The Brain Derived Neurotrophic Factor only had a limited effect when tested on humans, and even had partially negative consequences", says Prof. Dr. Stefan Wiese from the RUB Work Group for Molecular Cell Biology. "Therefore we are looking for alternative ways to find new approaches for the treatment of neurodegenerative diseases such as Amyotrophic Lateral Sclerosis."

Same effect, different mode of action

In previous studies, researchers hypothesised that vitamin P is an analogue of BDNF and thus works in the same way. This theory has been disproved by the team led by Dr. Teresa Tsai and Prof. Stefan Wiese from the Group for Molecular Cell Biology and the Department of Cell Morphology and Molecular Neurobiology headed by Prof. Andreas Faissner. Both substances ensure that isolated motor neurons of the mouse survive in cell culture and grow new processes, but what exactly

the molecules trigger at the protein level varies. BDNF activates two signalling pathways, the so-called MAP kinase and PI3K/AKT signal paths. Vitamin P on the other hand makes use only of the latter.

The dose is crucial

However, vitamin P only unfolded its positive effects on the motor neurons in a very small concentration range. "These results show how important an accurate determination of dose and effect is", says Prof. Wiese. An overdose of vitamin P reduced the survival effect, and over a certain amount, no more positive effects occurred at all. The researchers hope that vitamin P could have less negative side effects than BDNF. "It is easier to use, because vitamin P, in contrast to BDNF, can pass the blood-brain barrier and therefore does not have to be introduced into the cerebrospinal fluid using pumps like BDNF," says Wiese.

More information: T. Tsai, A. Klausmeyer, R. Conrad, C. Gottschling, M. Leo, A. Faissner, S. Wiese (2013): 7,8-Dihydroxyflavone leads to survival of cultured embryonic motoneurons by 2 activating intracellular signaling pathways, Molecular and Cellular Neuroscience, DOI: 10.1016/j.mcn.2013.02.007

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