Thomas Edlinger
Public relations and event management

Medical University of Graz
Neue Stiftingtalstraße 6
8010 Graz
thomas.edlinger@medunigraz.at

Press release
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Vitamin D and multiple sclerosis: The effect of the sunshine vitamin in the late stage of the disease

Graz, 4 April 2024: Multiple sclerosis (MS) is a chronic inflammatory disease of the central nervous system that affects around 13,500 people in Austria. Due to the different ways it progresses and its variety of symptoms, the "disease with a thousand faces" is difficult to research and treat. In a study conducted by the neuroimmunology research team at the Department of Neurology, Michaela Tanja Haindl has investigated in a laboratory model how vitamin D has an effect in late-stage multiple sclerosis and what consequences this may have for MS research in general.

When the nervous system suffers

Multiple sclerosis is a chronic and currently incurable inflammatory disease of the central nervous system (brain and spinal cord) in which the myelin sheaths of the nerve cells are attacked and destroyed. This demyelination leads to limited nerve cell functioning and disruption in the transmission of information. The area affected by the disease may be located anywhere in the brain and spinal cord, which is why symptoms greatly differ from patient to patient. The most common form of MS can be roughly divided into two phases: an inflammatory, intermittent early phase and a late phase in which hardly any inflammatory cells remain but there are more degenerative processes. "The early phase has been well researched and there are a variety of drugs available, but unfortunately this is not the case for the late phase," explains Tanja Haindl. A laboratory model that reconstructs the cellular characteristics of late-stage MS well was developed several years ago by Michaela Tanja Haindl and Muammer Üçal of Sonja Hochmeister's research team at the Medical University of Graz.

More vitamin D for better nerves

The effects of vitamin D on disease progression have now been analyzed in this laboratory model. In particular, the extent of damage to the cerebral cortex was observed over the course of the disease. It was demonstrated that significantly more cellular structures were preserved in this part of the brain in rats given vitamin D in addition to their normal diet. Not only were myelin and nerve cells better preserved but there was also a reduction in apoptotic cells and microglial activation. Animals given vitamin D had significantly fewer serum neurofilament light chains (sNfL). These filaments are currently regarded as a predictor of nerve cell damage and thus a biomarker for the progression/severity of multiple sclerosis.

In addition, the vitamin displayed an antioxidant effect in test animals, which was also detected in the blood serum. Rats treated with vitamin D had not only significantly more protective polyphenols in their blood but a higher total antioxidative capacity (TAC) as well. Since oxidative stress is considered to possibly trigger and intensify MS, this positive effect of the "sunshine vitamin" might be substantiated by further research.

Other findings

The study yielded several other interesting findings: It was shown that there is a significant difference between male and female animals in response to the administration of vitamin D. Female rats generally had a better TAC and more protective polyphenols in their blood. From a histological perspective, cellular structures were better preserved in female rats than male rats. In principle, both sexes benefited from vitamin D administration, yet interestingly male rats tended to benefit more, probably because of sex-associated differences in oxidative capacity and defense systems.
However, an uncritically high dosage of vitamin D is not recommended because this was shown to have a detrimental effect on the preservation of brain cells in the cerebral cortex. Both findings are currently the subject of further research.

Link to the study: https://pubmed.ncbi.nlm.nih.gov/37571246/

Further information and contact:
Michaela Tanja Haindl
Medical University of Graz
Department of Neurology
Tel.: +43 316 385 86862
michaela.haindl@medunigraz.at

Profile: Michaela Tanja Haindl
Michaela Tanja Haindl deals with neurological disorders and the question of how nerve tissue can be protected and repaired. She primarily uses immunohistochemical approaches to obtain insight into disease mechanisms. In her previous research, she has examined a specific type of cell, the astrocyte, and was significantly involved in developing a special laboratory model for investigating late-stage MS. The small research team has already achieved several successes, which were honored with an INGE St. Research Award in 2018 and the Styrian Research Promotion Award (*Förderungspreis des Landes Steiermark*) in 2019.