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A novel biomarker for multiple sclerosis

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An article published in *Experimental Biology and Medicine* (Volume 242, Issue 15, September, 2017) identifies opioid growth factor (OGF) as a novel biomarker for the onset and progression of multiple sclerosis (MS). The study, led by Dr. Patricia McLaughlin, Professor of Neural & Behavioral Sciences at Penn State University College of Medicine in Hershey, PA demonstrates that OGF (chemically termed [Met5]-enkephalin) levels were decreased in patients with MS relative to non-MS patients as well as MS-patients receiving disease-modifying therapies.

MS impacts more than 2 million people worldwide. MS is an immune-mediated disease that attacks myelin, the fatty substance that insulates nerve fibers, and disrupts communication between the brain/spinal cord and the body. Low dose naltrexone (LDN) is an off-label therapeutic prescribed for a variety of immune-related disorders, including MS. Naltrexone intermittently blocks the opioid receptors that control pain, reward, and addictive behavior, resulting in biofeedback events that increase production of OGF. Although LDN positively impacts the quality of life and fatigue levels in MS patients, its mechanism of action in MS patients has not been confirmed.

In the current study, Dr. McLaughlin and colleagues examined OGF levels in MS patients as well as an MS animal model. Serum levels of OGF were significantly reduced in MS patients when compared to normal individuals. Collaborative studies conducted by Michael Ludwig, a doctoral candidate in Anatomy in the laboratory of Drs. McLaughlin and Zagon, in the experimental autoimmune encephalomyelitis (EAE)

mouse model of MS found that reductions in OGF were prognostic of disease development. LDN treatment restored OGF levels in EAE mice and had no effect on OGF levels in normal mice.

These findings along with the availability of non-invasive technology for measuring OGF levels in patients, support OGF as a candidate biomarker for MS. Dr. McLaughlin stated that "Identification of OGF as a potential biomarker for MS supports our hypothesis for many years that the OGF signaling is dysregulated in MS patients. Randomized, controlled clinical trials on the treatment of MS patients with LDN are warranted given these new observations that OGF levels are deficient in these patients and restored following therapy. Further research on potential biomarkers associated with this pathway is needed in order to establish early detection of MS, and possibly understand the etiology of MS."

Dr. Steven R. Goodman, Editor-in-Chief of *Experimental Biology & Medicine*, said "McLaughlin and colleagues have researched the OGF-OGF receptor (OGFr) regulatory axis for several decades, and this seminal discovery of dysregulation in OGF expression in MS patients, and animal models, is very exciting and could lead to prognostic biomarkers for this autoimmune disorder."

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