

# Pain in fibromyalgia is linked to changes in brain molecule

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Researchers at the University of Michigan Health System have found a key linkage between pain and a specific brain molecule, a discovery that lends new insight into fibromyalgia, an often-baffling chronic pain condition.

In patients with fibromyalgia, researchers found, pain decreased when levels of the brain molecule called glutamate went down. The results of this study, which appears in the journal *Arthritis and Rheumatism*, could be useful to researchers looking for new drugs that treat fibromyalgia, the authors say.

"If these findings are replicated, investigators performing clinical treatment trials in fibromyalgia could potentially use glutamate as a 'surrogate' marker of disease response," says lead author Richard E. Harris, Ph.D., research assistant professor in the Division of Rheumatology at the U-M Medical School's Department of Internal Medicine and a researcher at the U-M Chronic Pain and Fatigue Research Center.

The molecule glutamate is a neurotransmitter, which means it conveys information between neurons in the nervous system. When glutamate is released from one neuron, it diffuses across the space between cells, and then binds to receptors on the next neuron in line and causes the cell to become excited, or to be more active.

This molecule was suspected to play a role in fibromyalgia because previous studies had shown that some brain regions in fibromyalgia patients appear to be highly excited. One such region is the insula.

In functional magnetic resonance imaging (fMRI) studies, researchers at U-M had previously shown that the insula displays augmented activity in fibromyalgia, which means neurons in these patients are more active in this part of the brain. The U-M team hypothesized, Harris notes, that

more activity among these neurons might be related to the level of glutamate in this region.

To gauge the linkage between pain and glutamate, the researchers used a non-invasive brain imaging technique called proton magnetic resonance spectroscopy (H-MRS). H-MRS was performed once before and once following a four-week course of acupuncture or "sham" acupuncture.

Researchers used either acupuncture or sham acupuncture to reduce pain symptoms. The sham procedure involved using a sharp device to prick the skin in order to mimic real acupuncture sensations.

Following the four weeks of treatment, both clinical and experimental pain reported were reduced significantly. More importantly the reduction in both pain outcomes was linked with reductions in glutamate levels in the insula: patients with greater reductions in pain showed greater reductions in glutamate. This suggests that glutamate may play a role in this disease and that it could potentially be used as a biomarker of disease severity.

Because of the small number of participants in this study, further research should be conducted to verify the role of glutamate in fibromyalgia, Harris says.

Source: University of Michigan

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