

Is Migraine a Lipid Disorder?

Sue Hughes | September 17, 2015

New research has suggested that migraine may be associated with irregularities in the metabolism of certain lipids, opening up new avenues for research into possible treatments and biomarkers for the condition.

The research, published online September 9 in *Neurology*, focused on a group of bioactive lipids known as sphingolipids, which are critical components of cell membranes and also play a role in regulating energy homeostasis, apoptosis, and inflammation.

The authors, led by B. Lee Peterlin, DO, from Johns Hopkins University School of Medicine, Baltimore, Maryland, note that neurologic disorders that are the result of severe deficiencies in enzymes that regulate sphingolipid metabolism have long been described (eg, Gaucher disease), and recent studies have suggested that even subtle changes of sphingolipid balance may be involved in dementia, multiple sclerosis, obesity, and pain.

Now they also are reporting a study showing changes in sphingolipid levels in patients with migraine, implicating in particular two sphingolipid subtypes: ceramide and sphingomyelin.

"Taken together, our findings suggest it is possible that migraine is a neurologic disorder of 'minor' sphingolipid dysmetabolism," they conclude. "Further research, validating the ceramide and sphingomyelin associations with migraine, as well as research examining mechanisms for these associations, may advance our understanding of migraine pathophysiology and open possibilities of the identification of novel migraine biomarkers and targeted drug therapies directed against sphingolipid pathways."

For the study, 52 women with episodic migraine (who had average of 5.6 headache days per month) and 36 women who did not have any headaches underwent a neurologic exam, had their body mass index measured, and gave blood samples for measurement of various sphingolipids.

The results showed that the total levels of ceramides were decreased in women with episodic migraine compared with in those women without any headache disorders.

Women with migraine had levels of approximately 6000 ng/mL vs about 10,500 ng/mL for women without headache.

Each standard deviation increase in total ceramide levels was associated with more than a 92% lower risk of having migraine.

In addition, two types of sphingomyelins were found to be raised in women with migraine, with each standard deviation increase associated with a 2.5 times greater risk for migraine.

The researchers also tested the blood of a random small sample of 14 of the participants for a panel of these lipids and were able to correctly identify those who had migraine or who were controls without headache, based on these blood lipid levels.

Diagnostic Tool

Finally, in a group of 14 of the study participants, the researchers correctly identified those with migraine and those without, based on the concentrations of a panel of sphingolipids. "While this finding should be cautiously interpreted given the small sample size, it suggests that sphingolipid panels may have the potential to be utilized as a migraine diagnostic tool," they write.

In an accompanying comment, Karl Ekbom, MD, from the Karolinska Institutet, Stockholm, Sweden, says the current research "was properly performed, based on compelling and clear thoughts on the pathophysiologic basis of the disease," and is "an important contribution to our understanding of the pathophysiology of migraine and may have vast practical clinical and therapeutic implications if it is supported by further studies."

Dr Ekbom stresses that the diagnosis of migraine is still a clinical one, based on a careful history of the patient and using internationally recognized clinical criteria. "In many persons, a clinical diagnosis may be difficult. Specific markers of the disease are therefore of particular interest," he notes. "However, before claiming that an altered sphingolipid metabolism might provide a diagnostic tool for migraine, a comparison should be made with other types of headache, e.g., cluster headache," he cautions.

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