

# monty's missing matter: HHMI working on it.

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Role of Docosaehaenoic Acid in Neuronal Plasma Membranes

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**Summary:** The omega-3 fatty acid docosaehaenoic acid (DHA n-3) has long been known to be a major component of phosphoglycerides in the gray matter of mammalian brains. Furthermore, early studies of synaptosomes that had been isolated from gray matter showed that the plasma membranes of the synaptosomes contained DHA n-3 that was selectively esterified to phosphatidylethanolamine, plasmenylethanolamine (alkenylacyl-glycero-phosphorylethanolamine), and phosphatidylserine. In contrast, the phosphatidylcholine in these membranes contained esterified oleic acid, and the sphingomyelin and glycolipids in the membranes contained amide-linked stearic acid instead of a mixture of this acid with other, amide-linked fatty acids. The full implications of this unusual distribution of lipid head groups, esterified fatty acids, and amide-linked fatty acids are unclear, but the phosphoglycerides and sphingosine-containing lipids appear to be distributed asymmetrically between the two leaflets of the plasma membrane lipid bilayer and are likely to contribute to a dynamic lipid substructure. Because very few neuronal plasma membranes have been isolated and characterized to date, a major challenge for the future will be to investigate the composition of the lipid bilayers of different neuronal plasma membranes and identify effects of DHA n-3-containing phosphoglycerides on the ability of the plasma membranes to perform their many different functions. The aim of this

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Perspective is to stimulate further work in this important area by discussing recent evidence related to the role of neuronal plasma membrane phosphoglycerides in cell signaling.

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