

Abstract

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Docosahexaenoic acid neurolipidomics.

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BACKGROUND: Mediator lipidomics is a field of study concerned with the characterization, structural elucidation and bioactivity of lipid derivatives actively generated by enzymatic activity. It is well known that omega-3 fatty acids are beneficial for brain function. Docosahexaenoic acid [DHA; 4 22:6(n-3)] is the most abundant essential omega-3 fatty acid present in the brain and it has multiple mechanisms of exerting protective effects after cellular injury. Certain lipid species produced from DHA early during the reperfusion stage of brain ischemia-reperfusion injury are generated in order to help the cell cope as the injury progresses.

DISCUSSION: We explore these newly discovered lipid mediators in order to understand their role in the cell. We have identified one of these potentially protective lipid mediators as a novel stereospecific DHA-derived fatty acid, called neuroprotectin D1 (NPD1; 10R,17S-dihydroxy-docosa-4Z,7Z,11E,15E,19Z hexaenoic acid). **DHA also has important roles in pro-survival signaling cascades after ischemia-reperfusion in injury.** It has been shown to accelerate AKT translocation and activation and has binding affinity with an important PPAR-gamma family of ligand-activated nuclear receptors that have been implicated in various aspects of lipid metabolism and have been shown to have anti-inflammatory actions.

SUMMARY: Here we present an overview of these mechanisms and discuss the potential of using DHA signaling in the development of treatments for the large population of patients suffering from the devastating consequences of stroke.

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