Omega-3 fatty acids, pro-inflammatory signaling and neuroprotection.

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PURPOSE OF REVIEW: To summarize recent findings that docosahexaenoate (DHA) is the precursor of stereospecific derivatives with anti-inflammatory and cytoprotective properties. RECENT FINDINGS: The docosahexaenoate-derived mediator neuroprotectin D1 is formed in retinal pigment epithelial cells when confronted with oxidative stress, in the brain during experimental stroke, and in the human brain from Alzheimer's disease patients as well as in human brain cells in culture. Neuroprotectin D1 displays potent anti-inflammatory and neuroprotective bioactivity. SUMMARY: Here, we summarize recent studies demonstrating that in brain ischemia-reperfusion and in retinal pigment epithelial cells exposed to oxidative stress stereospecific docosahexaenoate-oxygenation pathways are activated and lead to the formation of docosanoid messengers. Two docosahexaenoate-oxygenation pathways were identified: the first is responsible for the formation of the messenger neuroprotectin D1 and the second pathway, which is active in the presence of aspirin, leads to the formation of the resolvin-type mediators (17R-DHA). Neuroprotectin D1 induces antiapoptotic, anti-inflammatory signaling and is neuroprotective.