

Maintaining brain PUFA concentrations: A focus on uptake and rapid metabolism

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The brain is especially enriched with the polyunsaturated fatty acids (PUFA) docosahexaenoic acid (DHA) and arachidonic acid, while being virtually devoid of other PUFA such as eicosapentaenoic acid (EPA). It has been suggested that the plasma supply to the brain regulates brain PUFA levels. Candidate plasma pools that supply the brain with PUFA include the plasma unesterified pool, PUFA esterified to lysophosphatidylcholine or the uptake of PUFA-containing lipoproteins via lipoprotein receptors into endothelial cells of the blood brain barrier.

This paper will present recent studies that have examined the role of lipoprotein receptors and the kinetics of candidate plasma pools which supply the brain. Upon presenting evidence that the plasma unesterified pool is a major source of brain PUFA, especially for DHA, I will describe how rapid metabolism also maintains very low levels of certain PUFA, such as EPA. Because fatty acid uptake into the brain can be imaged, we can estimate brain PUFA, including DHA, requirements.

A better understanding of how PUFA enter and are metabolised within the brain could lead to new approaches to target the brain as well as new insights into brain function in health and disease with fatty acid imaging.