

Abstract

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Distribution, interconversion, and dose response of n-3 fatty acids in humans.

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BACKGROUND: n-3 Fatty acids have important visual, mental, and cardiovascular health benefits throughout the life cycle.

OBJECTIVE: Biodistribution, interconversion, and dose response data are reviewed herein to provide a basis for more rational n-3 dose selections. Docosahexaenoic acid (DHA) is the principal n-3 fatty acid in tissues and is particularly abundant in neural and retinal tissue. Limited storage of the n-3 fatty acids in adipose tissue suggests that a continued dietary supply is needed.

RESULTS AND DISCUSSION: A large proportion of dietary alpha-linolenic acid (ALA) is oxidized, and because of limited interconversion of n-3 fatty acids in humans, ALA supplementation does not result in appreciable accumulation of long-chain n-3 fatty acids in plasma. Eicosapentaenoic acid (EPA) but not DHA concentrations in plasma increase in response to dietary EPA. Dietary DHA results in a dose-dependent, saturable increase in plasma DHA concentrations and modest increases in EPA concentrations. Plasma DHA concentrations equilibrate in approximately 1 mo and then remain at steady state throughout supplementation. DHA doses of approximately 2 g/d result in a near maximal plasma response. Both dietary DHA and EPA reduce plasma arachidonic acid concentrations. Tissue contents of DHA and EPA also increase in response to supplementation with these fatty acids. Human milk contents of DHA are dependent on diet, and infant DHA concentrations are determined by their dietary intake of this fatty acid.

CONCLUSION: We conclude that the most predictable way to increase a specific long-chain n-3 fatty acid in plasma, tissues, or human milk is to supplement with the fatty acid of interest.

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