



Literature Reviews

Evaluation of clinical safety and beneficial effects of a fish oil containing lipid emulsion (Lipoplus, MLF541): Data from a prospective, randomized, multicenter trial.

Wichmann MW, Thul P, Czarnetzki HD, Morlion BJ, Kemen M, Jauch KW. *Crit Care Med.* 2007;35(3):700-706.

Reviewer:

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Abstract

There is much talk about good fats and bad fats and health. Fish oil gets a lot of good press and has been incorporated into Lipoplus, a lipid emulsion for parenteral nutrition. Researchers in Germany and Belgium have looked for benefits of Lipoplus over soybean-based Intralipid. In 256 patients planned for total parenteral nutrition for 5 days following major abdominal surgery. In a prospective, randomized, blinded study, the Lipoplus patients averaged hospital stays of 17 days while the Intralipid patients averaged 22 days ($p = .006$). No adverse effects of Lipoplus were identified.

The fish oil extract in Lipoplus contains eicosapentaenoic acid (EPA), and the emulsion is also supplemented with alpha-tocopherol (vitamin E). On day 6, plasma levels of both of those lipids were elevated above baseline in the Lipoplus group and were below baseline in the Intralipid group. Leukotriene B5 is derived from EPA, and the leukotriene B5 levels tracked those of EPA.

The authors plausibly invoke anti-inflammatory effects of EPA and antioxidant effects of tocopherol as mechanisms for shorter hospital stays in the Lipoplus patients.

Comments

Fish oil is a rich source of long chain polyunsaturated fatty acids of the type called n-3 or omega-3. For instance, EPA has 20 carbons and 5 sites of unsaturation (i.e., five C=C double bonds). The omega-3 designation indicates that the hydrophobic tail ends in $-\text{CH}=\text{CH}-\text{CH}_2-\text{CH}_3$. The omega-3s compete with arachidonic acid for enzymes that convert arachidonic acid to relatively inflammatory products.

Perhaps we should all take fish oil. After all, the fish oil bandwagon was prompted by the observation in Greenland that diets chronically high in fat but rich in fish oil appear to protect against heart disease. The present paper indicates that fish oil may also have acute benefits. It will be interesting to examine fish oil pharmacology in cardiovascular surgery patients. It may be difficult to fund such a study, though, because fish oil could be given orally in most cases, and oral preparations are inexpensive and generic.

It is particularly intriguing to wonder if oral or intravenous omega-3 therapy might favorably modify the inflammatory reaction to cardiopulmonary bypass. Theoretically, there might be increased risk of bleeding, but that problem was not noted in one small study (Charman A, et al. *Fish oil before cardiac surgery: neutrophil activation is unaffected but myocardial damage is moderated. Prostaglandins Leukot Essent Fatty Acids* 2005;72:257-65).

Unlike saturated fatty acids, polyunsaturates are (like certain amino acids, vitamins, and minerals) essential nutrients. Some polyunsaturates are derivable from others, but humans cannot synthesize polyunsaturates de novo. For sustenance, all patients receiving prolonged artificial nutrition require at least one exogenous polyunsaturate in their food.