



Effect of an n-3 Fatty Acid-Containing Lipid Emulsion on the Modulation of the Inflammatory and Metabolic Responses in Critically Ill Patients after Abdominal Aortic Aneurysm Surgery

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Background: Aortic aneurysm surgery usually provokes intense inflammatory reaction. Mediators of this stress response are eicosanoids originating from arachidonic acid (n-6 fatty acid). If provided early after surgery n-3 fatty acids may shift the proportion of eicosanoids originating from mainly **Eicosapentaenoic acid (EPA)** and **Docosahexaenoic acid (DHA)** towards anti-inflammatory cytokines. This hypothesis was tested by providing parenteral nutrition with and without n-3 fatty acids to patients after abdominal aortic aneurysm surgery.

Methods: In this prospectively randomized, double blind, parallel group, controlled trial 24 patients with an indication for parenteral nutrition for 4 days received either the standard parenteral nutrition containing LCT/MCT (**L**ong **C**hain **T**riglycerides, **M**edium **C**hain **T**riglycerides) emulsion (50:50) or a mixture of MCT/ LCT/FishOil (50:40:10). Patients were monitored for safety, enrichment of EPA and DHA and inflammatory parameters (eg. CRP, body temperature). Cytokine levels (IL-2, IL-6, IL-8, IL 10) were measured four times.

Results: Both treatment arms did not show signs of impaired safety during the conduct of the trial. An initial postoperative increase in CRP in both groups normalized progressively until the end of the trial. Body temperature showed a trend towards lower values in the Fish Oil group throughout the treatment period ($p = 0.09$). Levels of EPA and DHA increased significantly in the Fish Oil group ($p < 0.0001$). Compared to baseline values (day 0) significant reduction in pro-inflammatory IL-8 concentration could be observed in the Fish Oil group on day 2 ($p < 0.05$) and day 3 ($p < 0.007$) whereas anti-inflammatory IL-10 values rose significantly on day 2 in this group. Changes in the other cytokines measured did not reach significance. Early postoperative availability of Fish Oil as part of the lipid component in a parenteral nutrition regimen is safe, leads to a significant increase in EPA and DHA, reduces concentration of pro-inflammatory cytokines and may reduce inflammation associated complications.

Study site(s): Centre Universitaire Vaudois, Lausanne Switzerland
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Sponsor: B. Braun Melsungen AG

Publication: MM Berger et al. European Journal of Clinical Nutrition (2007) May 30, 1-7
Krauss-Etschmann S et al ESPEN 2005, Poster