

Omega-3 fatty acids improve the diagnosis-related clinical outcome

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BACKGROUND INFORMATION

1 kg = 2.2 lbs.

	.05 g / kg	.1 g / kg	.15 g / kg	.2 g / kg	.23 g / kg
100 lbs=45 kg	2250 mg	4550 mg	6750 mg	9100 mg	10,350 mg
150 lbs=68 kg	3400 mg	6800 mg	10,200 mg	13,600 mg	15,640 mg
200 lbs=91 kg	4500 mg	9100 mg	13,650 mg	18,000 mg	20,093 mg

FROM ABSTRACT:

Objective:

Supplementation of clinical nutrition with omega-3 fatty acid in fish oil exerts immunomodulating and organ-protective effects, even after short-term application.

The aim of this study was to evaluate dose-dependent effects of parenteral [means dripped into the body intravenously] supplementation of a 10% fish oil emulsion on diagnosis and organ failure related outcome.

Design:

Prospective, open label, multiple-center trial.

Patients and Methods:

A total of 661 patients from 82 German hospitals receiving total parenteral nutrition [TPN][means all of their nutrients are being supplied intravenously] for a minimum of 3 days were enrolled in this study.

The sample included 255 patients after major abdominal surgery, 276 with peritonitis and abdominal sepsis, 16 with nonabdominal sepsis, 59 after multiple trauma, 18 with severe head injury, and 37 with other diagnoses.

The primary study end point was survival; secondary end points were length of hospital stay and use of antibiotics with respect to the primary diagnosis and the extent of organ failure.

Results:

Total parenteral nutrition, including fish oil administered for 8.7 ± 7.5 days and lowered hospital mortality from 18.9% to 12.0%.

[This means a 7% reduction in hospital deaths is those given fish oil]

The fish oil did correlate with beneficial outcome (intensive care unit stay, hospital stay, mortality).

Fish oil had the most favorable effects on survival, infection rates, and length of stay when administered in doses between 0.1 and 0.2 g / kg body weight / day.

[For a 200 lb person, this is 9,100 – 18,000 mg fish oil per day, intravenously.]

Lower antibiotic demand by 26% was observed when doses of 0.15–0.2 g / kg body weight / day [13,650 – 18,000 mg / day for a 200 lb person] were infused as compared with doses of <0.05 g / kg body weight / day [< 4500 mg / day for a 200 lb person].

After peritonitis and abdominal sepsis, fish oil dose for minimizing intensive care unit stay was 0.23 g / kg body weight / day [20,093 mg / day for a 200 lb person] and there was an inverse linear relationship between dosage and intensive care unit stay in major abdominal surgery.

Conclusion:

Administration of omega-3 fatty acid may reduce mortality, antibiotic use, and length of hospital stay in different diseases.

Effects and effect sizes related to fish oil doses are diagnosis dependent.

[Future studies] may confirm the value of omega-3 fatty acid in the adjunctive therapy of peritonitis and abdominal sepsis.

THESE AUTHORS ALSO NOTE:

Long-term beneficial effects of omega-3 fatty acid (FA) intake include:

- 1) Improved cardiovascular health.
- 2) Improved health in cancer patients.

Rapid benefits of omega-3 fatty acid (FA) intake include:

- 1) Decreased inflammatory pulmonary vascular response.
- 2) Blunted lung edema formation was because of reduced proinflammatory series-4 leukotrienes.
- 3) Patients with acute respiratory distress show improved pulmonary function within a few days after omega-3 FA administration.
- 4) Improved health in patients with sepsis.
- 5) Enhanced hepatic immune competence in terms of bactericidal capacity after fish oil (FO) administration.

6) Improvement of liver and pancreas function after FO administration in patients undergoing major abdominal surgery.

“The basis for these beneficial effects was reduced release of proinflammatory arachidonic acid derivatives.” **[Important]**

The amino acid arginine has favorable effects on postoperative wound healing.

“The aim of the present study was to evaluate dose-dependent effects of parenteral [intravenous] supplementation of a 10% FO emulsion on diagnosis and organ failure related outcome in a prospective, open-label, multiple-center trial. The primary study end point was survival, and secondary end points were length of intensive care unit (ICU) stay, hospital stay, and use of antibiotics with respect to the primary diagnosis and extent of organ dysfunction.”

This study used 661 patients from 82 German hospitals. Patients had total parenteral nutrition (TPN) [intravenous] including FO for more than 3 days, regardless of the diagnosis.

The organs screened in this study were lung, heart, kidney, liver, blood (white blood cells or platelets), gastrointestinal tract, and central nervous system.

RESULTS

“The FO supplement was well tolerated.”

“No adverse events in terms of bleeding complications occurred.”

Fish oil doses of >0.05 g / kg body weight / day [4500 mg / day for a 200 lb person] were significantly associated with a reduction of both length of ICU and length of hospital stay.

Necessity for antibiotic treatment was significantly higher when fish oil doses of <0.15 g / kg body weight / day [$< 13,650$ mg / day for a 200 lb person] were administered.

Survival was significantly improved in doses of $0.1-0.2$ g / kg of body weight / day [9100 – 18,000 mg per day for a 200 lb person].

Mortality was significantly reduced in patients with abdominal sepsis, multiple trauma, and severe head injury.

DISCUSSION

The aim of this study was to evaluate dose-dependent effects of intravenous supplementation of fish oil on diagnosis and organ failure related outcome.

“The overall effect of FO administration, independent of dosage, was a reduction in hospital mortality from 18.9% to 11.9%.” **[Very Important]**

These results are well in line with those of 256 ICU patients scheduled for major abdominal surgery who received 10 g/day of intravenous fish oil, showing reduced hospital mortality, reduced requirement of postoperative mechanical ventilation, and hospital stay was shorter. [A 2004 study in the journal Clinical Nutrition]

Also, other prospective randomized studies on patients with abdominal sepsis receiving intravenous fish oil showed lower C-reactive protein levels as an indicator of a blunted inflammatory reaction, reduced need for reoperation, ICU and hospital stay was significantly reduced, mechanical ventilation and mortality were reduced.

In this study, fish oil supplementation exerted dose-dependent beneficial effects on the observed outcomes.

Significantly more patients survived when given 0.1–0.2 g / kg body weight / day [9100 mg – 18,000 mg / day for a 200 lb person], compared to receiving <0.05 g / kg body weight / day [< 4500 mg / day for a 200 lb person] omega-3 fatty acids.

The shorter length of both ICU and hospital stay “may be correlated with the lower requirement of antibiotic treatment when omega-3 FAs were given in daily doses between 0.15 and 0.2 g/kg.” [13,650 – 18,000 mg per day for a 200 lb person]

Other studies have also found “improved bactericidal activity in animals treated with omega-3 FA.” In human studies, perioperative administration of 10 g/day of fish oil reduced severity of infections due to reduced immune suppression as evidenced by elevated human leukocyte levels.

With fish oil supplementation, “a significant improvement in survival was observed as compared with predicted mortality.”

“Clinical data support the hypothesis that an optimum preoperative composition of cell membranes, before initiation of the inflammatory cascade, is more effective with respect to modulation of cytokine biology and patient recovery than mere postoperative nutrition therapy.” Thus, for elective surgery, preoperative administration of omega-3 FAs may be advantageous.

In the critically ill, early use of omega-3 oils is advisable, “before complex inflammatory host actions and overshooting reactions during systemic inflammatory response syndrome and sepsis commence.”

The design of this study was to investigate the effect of omega-3 FAs on outcome variables of patients with different diagnoses and distinct stages of organ failure.

CONCLUSION

“Supplementation with omega-3 FAs was associated with improved survival and accelerated patient recovery.”

“Omega-3 FAs may be a valuable nutritional additive to improve outcome in patients with peritonitis, trauma, abdominal systemic inflammatory response syndrome, and sepsis.”

KEY POINTS FROM DAN MURPHY

- 1) Supplementation with omega-3 fatty acids in fish oil exerts immune-modulating and organ-protective effects, even after short-term application.
- 2) Using a 200 lb. person example, these critically ill patients, who had to take all of their nutrients intravenously, were intravenously given omega-3 fish oil in the range between 4500 mg to 20,000 mg per day, for a minimum of 3 days. Higher doses were associated with improved outcomes.
- 3) Intravenous hospital administration of omega-3 fatty acids reduces mortality, antibiotic use (by 26%), and length of hospital stay in different diseases.
- 4) Long-term beneficial effects of omega-3 fatty acid intake include:
 - A)) Improved cardiovascular health.
 - B)) Improved health in cancer patients.
- 5) Rapid benefits of omega-3 fatty acid intake include:
 - A)) Decreased inflammatory pulmonary vascular response.
 - B)) Blunted lung edema formation was because of reduced proinflammatory series-4 leukotrienes.
 - C)) Patients with acute respiratory distress show improved pulmonary function within a few days after omega-3 FA administration.
 - D)) Improved health in patients with sepsis.
 - E)) Enhanced hepatic immune competence.
 - F)) Improvement of liver and pancreas function.
- 6) “The basis for these beneficial effects was reduced release of proinflammatory arachidonic acid derivatives.” **[Important]**

- 7) High dose intravenous fish oil supplementation (up to 20 g / day for a 200 lb person] "was well tolerated" and "no adverse events in terms of bleeding complications occurred."
- 8) Intravenous omega-3 administration in the range of 10 g / day is associated with enhanced bactericidal activity, reduced number of infections, reduced severity of infections, and less need for antibiotic use.
- 9) For elective surgery, preoperative administration of omega-3 FAs is beneficial because it changes the composition of cell membranes, before initiation of the inflammatory cascade is established.
- 10) In the critically ill, early use of omega-3 oils is advisable, "before complex inflammatory host actions and overshooting reactions during systemic inflammatory response syndrome and sepsis commence."
- 11) In this study, supplementation with omega-3 FAs both improved survival and "accelerated patient recovery."
- 12) "Omega-3 FAs may be a valuable nutritional additive to improve outcome in patients with peritonitis, trauma, abdominal systemic inflammatory response syndrome, and sepsis."

COMMENTS BT DAN MURPHY

The bottom line from this article is that for any of us, our families, or our patients that are going to have surgery, we (they) should supplement with high doses (somewhere in the range of 10 g / day) of omega-3 essential fatty acids for at least several weeks prior to the surgery.

For any of us, our families, or our patients that are post surgical, critically ill, or recovering from severe trauma in the hospital and being feed nutrients intravenously, the intravenous solution should include omega-3 fatty acids in the range of 4500 mg to 20,000 mg / day for a 200 lb. person.