Fish Oil in the Cancer Care Setting

**Clinical Questions**

- Is fish oil safe and effective to use concurrently with cancer treatment?
- Can fish oil decrease side effects of common chemotherapies?

**Context**

Fish oil contains several powerful omega-3 (n-3, ω-3) polyunsaturated fatty acids (PUFAs) that act to modulate the inflammatory cascade, most notably eicosapentaenoic acid (EPA 20:5 n-3) and docosahexaenoic acid (DHA 22:6 n-3).

Many human trials have shown the efficacy of fish oil concurrent with standard-of-care treatment for a variety of malignancies, without increasing unwanted side effects, and in many instances decreasing side effects. Recently, concern has developed over one mouse model study that found lowered response to cisplatin, attributable to 16:4 n-3, a fatty acid found in some fish. However, a human trial of fish oil concurrent with cisplatin did not show any lessening of cisplatin’s clinical effect.

**Evidence**

**Increases efficacy of chemotherapy:**

- An RCT (n=46) of patients with advanced NSCLC showed increased response rate to carboplatin with venorelbine or gemcitabine when given fish oil concurrently (p=0.008), leading to a 55% increase in 1-year survival.
- An RCT (n=30) of individuals undergoing chemotherapy for colorectal cancer found significantly increased time to disease progression in individuals supplementing with 2g per day of fish oil concurrent with standard-of-care chemotherapy [time to tumor progression 593 days (±211.5)] vs. control [330 days (± 135.1)].
- A phase II trial (n=25) of women with metastatic breast cancer who were treated with an anthracycline and also supplemented with DHA found that those with an inherent ability to incorporate DHA into plasma phospholipids nearly doubled their overall survival (34 months vs. 18 months) when compared with those who were less effective at incorporating DHA (p=0.02).
- Women with greater levels of ω-3 polyunsaturated fatty acid (PUFA) in breast adipose tissue have a significantly greater response rate to chemotherapy for breast cancer (p=0.03).

**Improves surgical outcomes:**

- An RCT of people undergoing gastrectomy for gastric carcinoma (n=60) found the incidence of postoperative infection to be significantly less with preoperative supplementation with ω-3 PUFAs and arginine (p <0.05).
- An RCT (n=44) found that liver and pancreatic function (as measured by AST, ALT, bilirubin, and LDH levels in blood) is improved with postoperative fish oil supplementation in individuals undergoing surgery for gastrointestinal or pancreatic cancers (p<0.05).

**Decreases cancer cachexia and weight loss:**

- Multiple RCTs of patients with NSCLC treated with first-line chemotherapy and fish oil showed less weight loss, and in some instances weight gain, as well as maintenance of more skeletal muscle mass than controls.
- An RCT of patients with colorectal cancer (n=23) found that patients were able to maintain weight during chemotherapy when supplemented with fish oil (p=0.01).
- An RCT of children with leukemia (n=51) showed increased appetite (p<0.05) and upper arm muscle circumference (p<0.001) with supplemental fish oil.

**Decreases cancer treatment side effects:**

- An RCT of women on paclitaxel for breast cancer found 70% lowered risk of peripheral neuropathy with concurrent fish oil supplementation (p=0.029).
- Fish oil supplementation improved neutrophil counts (p<0.05) as well as increased phagocytosis
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(p<0.001) in an RCT of individuals undergoing treatment with 5-FU (n=38).15

- An RCT (n=40) showed increased overall quality of life as measured by physical function (p<0.01), cognitive function (p<0.01) and social function (p=0.04) when patients were supplemented with fish oil while going through standard-of-care treatment for stage III NSCLC.16

- 4g of combined DHA/EPA daily over three months were found to decrease bone resorption (p<0.05) in an RCT of women taking aromatase inhibitors for breast cancer (n=38).17

May improve efficacy of radiotherapy:

- Several in vitro studies have demonstrated enhanced cytotoxicity of radiation therapy when cancer cells are exposed to EPA and DHA by enhancing lipid peroxidation and subsequent apoptosis.18, 19

Decreases inflammation:

- Patients with advanced inoperable NSCLC undergoing chemotherapy had significantly lower levels of CRP (p<0.05) and IL-6 (p<0.05) than controls in an RCT of 850mg of daily EPA/DHA (n=33).20

- An RCT of patients undergoing surgical resection of gastric tumors found lower inflammatory markers, ICAM-1, and IL-6.21

References: