

INTERACTION BETWEEN FISH AND VEGETABLE OILS IN RELATION TO RAT LEUCOCYTE  
EICOSAPENTAENOATE CONTENT AND LEUKOTRIENE PRODUCTION.

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Several clinical trials have demonstrated that large doses of dietary fish oil (15-20 g/day) (a) increase the neutrophil content of the n-3 fatty acid, eicosapentaenoic acid (EPA), (b) increase neutrophil synthesis of the lipid inflammatory mediator, leukotriene B<sub>4</sub> (LTB<sub>4</sub>), and (c) decrease symptoms in patients with rheumatoid arthritis (Cleland et al., 1988). It is possible that other fats in the diet could decrease the incorporation of EPA into neutrophils and the anti-inflammatory effect of dietary fish oil which may partially result from a decrease in LTB<sub>4</sub> synthesis.

We examined the influence of mixtures of dietary fish oil and three vegetable oils (linseed, olive, and sunflower) on the incorporation of dietary eicosapentaenoic acid (EPA) into rat leucocyte phospholipids and the subsequent metabolism of EPA and arachidonic acid (AA) by 5-lipoxygenase. The content of EPA in leucocyte phospholipids of fish oil-fed rats was decreased by the addition of each of the three vegetable oils to the dietary fish oil with sunflower oil, the oil highest in linoleate (LA), having the largest EPA-lowering effect (66% decrease). The rate of synthesis of leukotriene B<sub>4</sub> (LTB<sub>4</sub>) was increased by the addition of each of the three vegetable oils to the basic fish oil diet with sunflower oil having the largest effect on LTB<sub>4</sub> synthesis (145% increase). The effects of olive oil (enriched in oleate) were similar to those of linseed oil (enriched in  $\alpha$ -linolenic acid) with regard to EPA incorporation (mean decrease = 30%) and LTB<sub>4</sub> synthesis (mean increase = 72%) (see Table).

DIETARY OIL	NEUTROPHIL PHOSPHOLIPID EPA CONTENT (%)	NEUTROPHIL LTB <sub>4</sub> SYNTHESIS (ng/10 <sup>6</sup> cells/5 min)
Fish (5%)	14.0	7.5
Fish (10%)	15.2	7.3
Fish (5%) + Olive (5%)	9.2	12.2
Fish (5%) + Linseed (5%)	10.4	13.7
Fish (5%) + Sunflower (5%)	4.8	18.4

The level of AA in leucocyte membranes and the rate of synthesis of LTB<sub>4</sub> was proportional to the level of dietary LA added to the basic fish oil diet. The results indicate that olive or linseed oil ingested in combination with fish oil have less effect than sunflower oil on leucocyte EPA content and LTB<sub>4</sub> production. They further suggest that, when ingested with fish oil, dietary LA is more important than oleate or  $\alpha$ -linolenate as a determinant of these variables. Such considerations are important for the design of studies to investigate the effects of dietary fish oil on inflammatory disorders.

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