

**Omega-3 Fatty acids (fish oil) as an anti-inflammatory: an alternative to
Nonsteroidal Anti-Inflammatory Drugs for Discogenic Pain
Surgical Neurology**

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This paper won first prize in the poster competition at the American Association of Neurological Surgeons Annual Meeting, New Orleans, LA, April 2005

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FROM ABSTRACT:

Background:

The use of NSAID medications is a well-established effective therapy for both acute and chronic nonspecific neck and back pain.

Extreme complications, including gastric ulcers, bleeding, myocardial infarction, and even deaths, are associated with their use.

An alternative treatment with fewer side effects that also reduces the inflammatory response and thereby reduces pain is believed to be omega-3 EFAs found in fish oil.

We report our experience in a neurosurgical practice using fish oil supplements for pain relief.

Methods:

From March to June 2004, 250 patients who had been seen by a neurosurgeon and were found to have nonsurgical neck or back pain were asked to take a total of 1200 mg per day of omega-3 EFAs (eicosapentaenoic acid and decosahexaenoic acid) found in fish oil supplements.

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Results:

78% were taking 1200 mg and 22% were taking 2400 mg of EFAs.

After an average of 75 days on fish oil"

59% discontinued to take their prescription NSAID medications for pain.

88% stated they were satisfied with their improvement and stated they would continue to take the fish oil.

There were no significant side effects reported.

Conclusions:

Our results mirror other controlled studies that compared ibuprofen and omega-3 EFAs demonstrating equivalent effects in reducing arthritic pain.

Omega-3 EFA fish oil supplements appear to be a safer alternative to NSAIDs for treatment of nonsurgical neck or back pain.

THESE AUTHORS ALSO NOTE:

Blockage of the COX enzyme inhibits the conversion of arachidonic acid to the very proinflammatory PGs that mediate the classic inflammatory response of pain (dolor), edema (tumor), elevated temperature (calor), and erythema (rubor).

"More than 70 million NSAID prescriptions are written each year, and 30 billion over-the-counter NSAID tablets are sold annually."

[Notice, 30 BILLION over-the-counter NSAID tablets are sold annually]

"5% to 10% of the adult US population and approximately 14% of the elderly routinely use NSAIDs for pain control."

Selling NSAIDs is a multibillion-dollar industry.

Almost all patients who take the long-term NSAIDs will have gastric hemorrhage, 50% will have dyspepsia, 8% to 20% will have gastric ulceration, 3% of patients develop serious gastrointestinal side effects, which results in more than 100,000 hospitalizations, an estimated 16,500 deaths, and an annual cost to treat the complications that exceeds 1.5 billion dollars.

“NSAIDs are the most common cause of drug-related morbidity and mortality reported to the FDA and other regulatory agencies around the world.”

One author referred to the “chronic systemic use of NSAIDs to ‘carpet-bombing,’ with attendant collateral end-stage damage to human organs.” **[WOW]**

COX 2 inhibitors [Celebrex, Vioxx, Bextra], designed to alleviate the gastric side effects of COX 1 NSAIDs, are “not only associated with an increased incidence of myocardial infarction and stroke but also have no significant improvement in the prevention of gastric ulcers.” **[Important]**

Alternatives to NSAIDs include:

- 1) Turmeric, the fragrant yellow spice found in curry.
- 2) Boswellia, an extract from a tree in India.
- 3) Bromelain, an enzyme contained in pineapple that interferes with PG synthesis.
- 4) White willow bark, a natural precursor to aspirin but without gastrointestinal side effects.
- 5) Green tea, a potent antiinflammatory and antioxidant.

“The agent best documented by hundreds of references in the literature for its anti-inflammatory effects is omega-3 EFAs found in fish and in pharmaceutical-grade fish oil supplements.”

Injured cell membranes release EPA and DHA omega-3s which inhibit the proinflammatory interleukins (IL-1, IL-6, and IL- 12), tumor necrosis factor-alpha, and the 2 series inflammatory prostaglandins (PGE2).

“There is extensive documentation in the rheumatology, ophthalmology, and cardiovascular literature on the beneficial anti-inflammatory affects of high-dose fish oil in the reduction of joint pain from rheumatoid and osteoarthritis, improvement in dry eyes and macular degeneration, and also major positive affects on lipid profile, plaque formation arrhythmias, and reduction in infarction from coronary arthrosclerosis, which is now considered an inflammatory disease.”

In this study, "most patients stopped their NSAIDs and pain medicines after 2 months on fish oil."

The majority of the 250 patients in this study had degenerative disk disease with facet arthropathy in the lumbar and/or cervical spine. All were taking NSAIDs with 75% on COX 2 inhibitors.

The patients took omega-3 EFAs (EPA and DHA) found in pharmaceutical-grade fish oil supplements at a dose of 2.4 g for 2 weeks then 1.2 g thereafter. After the initial 2-week period, they tapered off of their NSAIDs over 1 to 2 weeks. [IMPORTANT, they started to reduce NSAIDs after 2 weeks of omega-3 supplementation]

After 75 days on fish oil, 59% had stopped taking any NSAID medication for pain and 88% stated they would continue to take the omega-3 EFA (fish oil).

"There were no significant side effects reported except for 2 patients who reported loose bowel movements."

DISCUSSION

Both natural and synthetic corticosteroids have powerful anti-inflammatory effects, but they also have "well-described side effects primarily related to decreased healing capabilities, decrease in the normal protective aspects of the immune response, and also significant bone and gastric side effects."

"The literature reviewing rheumatoid and osteoarthritis, both chronic inflammatory conditions, consistently report improvements in joint pain and function by using omega-3 EFAs."

ARACHIDONIC

ACID

20 Carbon Long Omega-6 Fat

EICOSAPENTAENOIC

ACID

20 Carbon Long Omega-3 Fat

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COX	LOX	COX	LOX
Enzymes	Enzymes	Enzymes	Enzymes
SERIES 2	SERIES 4	SERIES 3	SERIES 5
Prostaglandins	Leukotrienes	Prostaglandins	Leukotrienes

PRO-INFLAMMATORY

ANTI-INFLAMMATORY

The more EPA from fish oil, the less COX and LOX are available for the arachidonic acid / pro-inflammatory pathway.

“NSAIDs have been the mainstay for treatment of chronic spine pain as well as other conditions related to inflammation and has grown to more than 9 billion US dollars in annual sales.”

On September 30, 2004, the FDA acknowledged the voluntary withdrawal of Vioxx (rofecoxib), a COX-2 selective NSAID manufactured by Merck & Co. because of an increased risk of serious cardiovascular events, including myocardial infarction and strokes, stemming from a clinical trial to determine whether Vioxx could reduce the risk of colon cancer.

COX-2 inhibitors both significant increase gastric and cardiovascular side effects.

Essential fatty acids are used to produce the phospholipids that are necessary for formation and maintaining integrity of healthy cell membranes, neuronal development, and functioning of the brain and nervous system.

Western diets have high levels of corn oil, sunflower oil, and safflower oil, which contain the omega-6 fatty acid linoleic acid, which leads to the formation of arachidonic acid, which then forms the proinflammatory PGE2.

“Animal proteins, especially red meat, also contain an abundant amount of arachidonic acid.”

A deficiency in omega-3 fatty acids, especially EPA and DHA, will result in a deficiency of PGE3 and series 5 leukotrienes, both of which are anti-inflammatory PGs.

EFA's are also required for the production of hormone-like substances called eicosanoids (thromboxanes, leukotrienes, and PGs).

Eicosanoids regulate numerous body functions including blood pressure, blood viscosity, vasoconstriction, immune function and the inflammatory response.

EPA and DHA are omega-3 EFA's found in the highest concentrations in fish oil.

Omega-3 DHA and EPA are used to make the anti-inflammatory eicosanoids (PGE3), whereas excess omega-6 EFA's form inflammatory arachidonic acid based eicosanoids (PGE2).

Because delta-5 desaturase enzyme converts dihomo-gamma-linolenic acid to arachidonic acid, which is then converted to inflammatory PGs, delta-5 desaturase acts as a gatekeeper to inflammation and, therefore must be controlled.

Elevated insulin [from being diabetic, consuming refined carbohydrates, or consuming any high fructose corn syrup] increases delta-5 desaturase activity increasing chronic inflammation, and coronary artery disease. **[Important]**

"To encourage the production of anti-inflammatory PGs and to discourage the production of inflammatory PGs, saturated fats, trans-fatty acids, and arachidonic acid should be reduced in the diet; blood glucose should be controlled; and appropriate amounts of omega-3 fatty acids found in fish oils should be consumed."

Omega-3 EFA fish oil acts as a natural anti-inflammatory and an alternative choice to NSAIDs.

Research supports that omega-3 supplementation is safe and effective for many inflammation-related conditions and have no side effects.

The higher level of EPA (DHA) one has, the more COX is shifted or consumed to make more of the anti-inflammatory PGs rather than pro-inflammatory PGs from arachidonic acid. This is also why COX inhibiting drugs can "inhibit the effectiveness of fish oil." **[Important]**

"The US Department of Agriculture has limited fish consumption to 1 fish serving per week in adults and even less in children and pregnant women because of the

concern of toxic contaminants such as mercury, polychlorinated biphenyls, and dioxin in our fish population.”

“For this reason, the most usable form of omega-3 EFA is fish oil supplements, which have been purified to remove any of these contaminants.”

There is no known unsafe upper limit for omega-3 supplementation.

Eskimo diets have been reported to have up to 16 g of omega-3s per day.

If patients are on anticoagulants, close monitoring by a physician for possible alterations in coagulation status is important. **[Important]**

Omega-3s are a natural food supplement and side effects are very rare.

Occasionally, omega-3s at dosages above 5g, will cause stearrhea.

These authors did not recommend the fish oil for those on anticoagulants or fish-related allergies, but noted “aspirin use was not a contraindication.”

KEY POINTS FROM DAN MURPHY

1) The use of NSAIDs is associated with extreme complications, including gastric ulcers, bleeding, myocardial infarction, stroke, and even death.

2) In this study, after 75 days on fish oil, 59% of patients who were taking NSAIDs for chronic spinal pain and who had degenerative spine disease, were able to discontinue their prescription NSAIDs, and 88% stated they were satisfied with their improvement and that they would continue to take the fish oil.

3) In this study, fish oil supplementation was not associated with any significant side effects.

4) “Omega-3 EFA fish oil supplements appear to be a safer alternative to NSAIDs for treatment of nonsurgical neck or back pain.”

5) “More than 70 million NSAID prescriptions are written each year, and 30 billion over-the-counter NSAID tablets are sold annually.”

[Notice, 30 BILLION over-the-counter NSAID tablets are sold annually]

6) “5% to 10% of the adult US population and approximately 14% of the elderly

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routinely use NSAIDs for pain control.”

- 7) Selling NSAIDs is a 9 billion dollar per year US industry.
- 8) Prescription NSAIDs for rheumatoid and osteoarthritis alone conservatively cause 16,500 deaths per year.
- 9) “NSAIDs are the most common cause of drug-related morbidity and mortality reported to the FDA and other regulatory agencies around the world.”
- 10) “The agent best documented by hundreds of references in the literature for its anti-inflammatory effects is omega-3 EFAs found in fish and in pharmaceutical-grade fish oil supplements.”
- 11) The beneficial anti-inflammatory affects of high-dose fish oil include the reduction of joint pain from rheumatoid and osteoarthritis, improvement in dry eyes and macular degeneration, reduced plaque formation, reduced arrhythmias, and reduced infarction from coronary atherosclerosis.
- 12) Both natural and synthetic corticosteroids decreased healing capabilities, decreased the normal immune response, and have significant bone and gastric side effects.
- 13) COX-2 inhibitors significantly increase gastric and cardiovascular side effects.
- 14) Omega-3 DHA and EPA are used to make the anti-inflammatory eicosanoids (PGE3), whereas excess omega-6 EFAs form inflammatory arachidonic acid based eicosanoids (PGE2).
- 15) “Animal proteins, especially red meat, also contain an abundant amount of arachidonic acid.”
- 16) A deficiency in omega-3 fatty acids, especially EPA and DHA, will result in a deficiency of anti-inflammatory prostaglandins.
- 17) The delta-5 desaturase enzyme is the gatekeeper to inflammation and is increased from elevated levels of insulin [from being diabetic, consuming refined carbohydrates, or consuming any high fructose corn syrup].
- 18) “To encourage the production of anti-inflammatory PGs and to discourage the production of inflammatory PGs, saturated fats, trans-fatty acids, and arachidonic acid should be reduced in the diet; blood glucose should be controlled; and appropriate amounts of omega-3 fatty acids found in fish oils should be consumed.”

- 19) Omega-3 supplementation is safe and effective for many inflammation-related conditions and has a low incidence of side effects.
- 20) NSAIDs inhibit the effectiveness of fish oil in producing anti-inflammatory prostaglandins.
- 21) "The US Department of Agriculture has limited fish consumption to 1 fish serving per week in adults and even less in children and pregnant women because of the concern of toxic contaminants such as mercury, polychlorinated biphenyls, and dioxin in our fish population."
- 22) These authors did not recommend the fish oil for those on anticoagulants or fish-related allergies, but noted "aspirin use was not a contraindication."

Linoleic Acid 18:2n-6

**Corn, Cottonseed, Sunflower,
Safflower, Peanut, Soy, Canola**

DiHomoGammaLinolenic Acid

PGE1

DHGLA

20:3n-6

Activated By Insulin

Inhibited By EPA

Delta-5-desaturase

D5D

Creates Arachidonic Acid (AA)

20:4n-6

Cox 1

Cox 2

Production of **Cox 3**

Increase SNS

CAs

Prostaglandin E2

Fibrosis
of repair

PGE2

#2 cause

INFLAMMATION

Free Radicals

CAUSE: Pain, DJD, Vascular Disease,

Immune System Dysfunction: Increased IgE and Reduced IgG

Alpha-Linolenic Acid ALA

18:3n-3

Flax, Hemp, Walnut

Eicosapentaenoic Acid

EPA causes more PGE3

20:5n-3

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Cold Water Fatty Fish
Powerfully Anti-Inflammatory

Docosahexaenoic Acid

DHA

22:6n-3

Cold Water Fatty Fish

Algae Oil Source

Builds Brain Synapses

Increases Production of Serotonin,
Dopamine