The role of Omega 3 polyunsaturated fatty acids in the treatment of the physical symptoms of rheumatoid arthritis.

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Introduction

Rheumatoid arthritis (RA) is an autoimmune disease characterized by inflammation in the joints which affects one percent of the population. It presents as joint stiffness, tenderness, swelling and redness. There are genetic, hormone, and environmental factors that are associated with the development of RA. Inflammation associated with RA functions as a protective mechanism to eliminate pathogens and toxins, and increases oxygen and nutrients in order to repair damaged tissue. Granulocytes, monocytes and macrophages are part of the inflammatory process that functions to destroy the pathogen, remove cellular and tissue debris, and promote tissue repair. Omega 6 fatty acids produce a different series of leukotrienes and prostaglandins that promote inflammation compared to the series produced by omega 3 fatty acids. Arachidonic acid is formed from linoleic acid (omega 6) which contributes to inflammatory processes leading to rheumatoid arthritis. EPA and DHA are important products produced from linolenic acid (omega 3) that can decrease the production of pro-inflammatory cytokines.

Previous Methodology

Previous studies investigating the role of omega 3 in treatment of RA used subjects with various stages of the disease and did not specify the age of the subjects. The majority of studies use three grams of omega 3 polyunsaturated fatty acids in the form of fish oil supplements. However, the amount and ratio of EPA and DHA varies depending on the study. The typical study length is twelve weeks to reveal benefits. The previous history and diet of the subjects is not well controlled or recorded to determine the effects of these on the results.

Objective

The purpose of this research was to examine the effects of omega 3 polyunsaturated fatty acids on the physical symptoms of people with rheumatoid arthritis.

Mechanisms

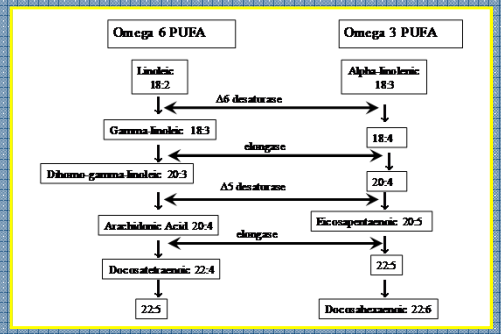

Figure 1: How omega 6 polyunsaturated fatty acids and omega 3 polyunsaturated fatty acids are broken down into their respective products. Both compete for the enzymes desaturase and elongase (Shils).

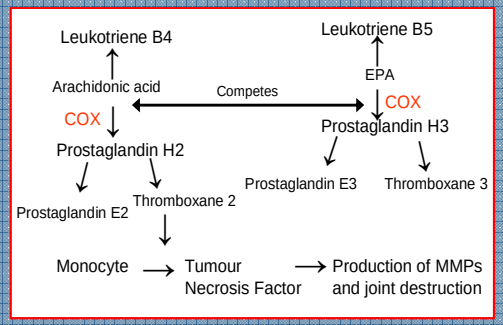

Figure 2: The breakdown of arachidonic acid and EPA to inflammatory and noninflammatory agents respectively. Arachidonic acid is broken down into series 2 and 4 of prostaglandin and leukotriene respectively. EPA is broken down into series 3 and 5 of prostaglandin and leukotrienes respectively.

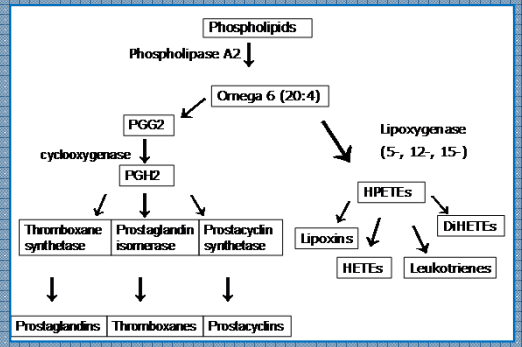

Figure 3: The mechanism for the breakdown of phospholipids into omega 6 polyunsaturated fatty acids and into inflammatory agents with the necessary enzymes (Shils).

Food Sources of Omega 3

- Salmon
- Halibut
- Tuna
- Green leafy vegetables
- Nuts: walnuts, brazil nuts, hazelnuts, pecans
- Oils: canola, rapeseed, flaxseed
- Seeds: sesame
- Eggs

Summary

1. Clinical studies provide evidence for and against omega-3 polyunsaturated fatty acids supplements for management of RA.
2. Omega 3 polyunsaturated fatty acids compete for desaturase and elongase enzymes that are used for the metabolism of omega 6 polyunsaturated fatty acids.
3. The three and five series of omega 3 products have less of an inflammatory response on the body compared to the two and four series from omega 6 fatty acids. Overall, omega 3 produces products that are less inflammatory than the omega 6.
4. Inflammation produces excessive amounts of interleukins and releases lipid mediators. Eiconsanoids produced from arachidonic acid are released from the phospholipid membrane within cells. The body releases EPA to compete with arachidonic acid for the enzymatic metabolism.
5. EPA and DHA are products of omega 3 fatty acids that compete with arachidonic acid (omega 6).
6. Overall, omega 3 polyunsaturated fatty acid is a time-dependent and dose-dependent treatment for the physical symptoms of people with rheumatoid arthritis.

Future Research

•New research is needed that is focused on the impact of supplementation with omega 3 for subjects having different stages of the disease,
• A minimum of three grams of fish oil supplements daily should be provided to determine if the benefits of omega 3 fatty acid on RA vary by stage of the disease.
•Impact of a diet rich in omega 3 sources on incidence and progression has not been investigated