

### **Anti-Inflammatory Diet and *Trans* fats;**

Nobody likes aches, pain & stiff creaky joints. These are most commonly caused by inflammation. Inflammation is at the root of many other chronic medical conditions including coronary artery disease, autoimmune disorders, arthritis, Alzheimer's disease and cancer.<sup>1</sup>

There are essential fatty acids that the human body is unable to synthesize (thus the term "essential"). These fatty acids have important anti-inflammatory activities. Before getting into the nitty gritty of the article it's important to review how fats are classified:

Saturated fats come from animal sources such as meat and dairy products; the carbon chain is fully saturated with hydrogen atoms. The more saturated a fat is, the more likely it will be a solid at room temperature and the higher the temperature that is needed to melt that fat. Think of cooking bacon in a pan, while hot, the grease is in the liquid state, turn the heat off and it will solidify.

Mono-unsaturated fats (Omega 9 family) include olive & canola oil, "unsaturated" refers to the presence of a double bond between two carbon atoms in the chain in one location, thus "mono" unsaturated. The double bond replaces full saturation with hydrogen atoms on each carbon in the chain. The "9" comes from the number of carbon atoms away from the carboxylic acid end of the chain. Omega 9's have the double bond 9 carbons away from the carboxylic acid base carbon.

Polyunsaturated fats are the essential fats with more than 1 set of double bonded carbon atoms. When there is a double bond, the carbon chain can continue down either the "left" or "right" side of one of the carbon atoms. If the chain continues on the same side it's called "cis", "trans" is what happens when the chain switches sides at the double bond. The polyunsaturated fats come from a variety of different sources depending on the level of the first double bond. Omega-3 includes alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) & docosahexaenoic acid (DHA). Omega-6 acids include linoleic acid (LA), gamma linolenic acid (GLA) and arachidonic acid (AA).

Hang on folk's, we're almost done with the organic chemistry, it's important to understand where the inflammation comes from. Arachidonic acid (AA) is the main precursor to what is known as the inflammatory cascade. This is the system that our bodies use to cause inflammation. Without the ability to have inflammation, we would be dead. Our immune system maintains constant surveillance all over our body looking for evidence of attack by viruses, fungi & bacteria. Inflammation is the process that helps isolate any problems and bring in the cellular reinforcements to fight off potentially lethal infections. Prostaglandins and leukotrienes are the next phase of the inflammation cascade. The term "cascade" is used because the system actually amplifies the response. The first reaction causes multiple products that react to form the second reaction forming ever larger multiples of products and so on... Well that's great, now we have a chain reaction with amplification of these cascades. What keeps us from dying a painful death of diffuse inflammation all over our bodies?

Omega-6 acids and their derivatives tend to be pro-inflammatory while Omega-3's are anti-inflammatory. In the 1900's we didn't have margarine, artificially saturated fats and all of the problems with auto-immune (when the immune system mistakenly fights our own body causing) diseases such as Rheumatoid Arthritis, Systemic Lupus Erythematosus etc). In the 1900's the ratio of Omega-6 to Omega-3 was 4:1. This is the way our divine blueprint was designed for us to run. In today's "modern" world, the ratio of 6 to 3 is more like 25:1. We can thank all of the highly processed and artificial foods in our diet.

Fats are saturated by using heat and pressure with hydrogen to artificially break the carbon double bonds and replace them more hydrogenated carbon chains. This is helpful in prolonging shelf life of foods. It seems like a Twinkie will look fresh for a decade or more.

Changing to less Omega-6's in the diet can be helpful in many inflammatory states. This includes the autoimmune diseases as well as diseases such as coronary artery disease and atherosclerosis which have an inflammatory component.

Delta-6 Desaturase is the main enzyme that both Omega-3 & Omega-6 fatty acids start in the cascade that starts the inflammatory cascade. This enzyme can be influenced to produce more Omega-6 (inflammatory) than Omega-3 (anti-inflammatory) products. So what influences this steering of the enzyme? Excess use of alcohol, diabetes, stress, excessive body weight and consumption of empty calories such as too many highly concentrated sweets aggravate inflammation by way of this enzyme.

Where do we get the good Omega-3 Fatty Acids? Cold-water fish are the best source, including salmon, mackerel, sardines, herring and albacore tuna are good sources as long as they're not farm raised. Farmed fish lack Omega-3's since they are fed grain products instead of the algae and plankton as well as smaller fish that feed on these sources of Omega-3's. Flax seed can also be a good source of Omega-3's.

Other foods can influence the conversion in the Omega-3 direction. Quercetin found in onions and apples inhibits phospholipase A2, cyclooxygenase and lipoxygenase reducing AA, prostaglandins, thromboxanes and leukotrienes.

Other nutrients that are beneficial include curcumin (turmeric), capsaicin (red pepper) and ginger. Spices including Rosemary & Boswellia also help lower the Omega-6 and raise the Omega-3.

How much Omega-3 Fatty acids should you take? If you're trying to treat active inflammation you can go to 4 gm (4,000 mg) daily of fish oil and/or flax. Check into the amounts of EPA/DHA in the oils. EPA is very good at controlling pain with the inflammation. Both are important for proper brain growth, development & metabolism. Taking too much Omega-3's can actually be harmful and worsen inflammation by creating excess free-radicals. If it's necessary to take high doses of Omega-3 fatty acids it's important to take adequate anti-inflammatory meds such as Vitamins C&E and selenium.

More information is available in the library section of our website; [www.tequestafamilypractice.com](http://www.tequestafamilypractice.com) .

Stay Healthy!

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<sup>1</sup> Rakei, D; Integrative Medicine, 1<sup>st</sup> Edition, Philadelphia PA, Saunders Press, 2003, p 667