Image Awareness Wellness Institute

Queen of Fats (Part 1)

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History

In recent newsletters I have discussed how we tend to overestimate the importance of cholesterol. Saturated fats are not the ogres we have been led to believe unless they are highly oxidized.

In this newsletter we shall discuss how, even with all the promotion, we underestimate the importance of omega-3 fats for long term health and vitality. With the increasing realization that saturated fats are not near as harmful as concentrated carbohydrates, diets like the Atkins diet have become popular. These diets are often effective for long term weight loss. Calorie counting without restriction of carbohydrates is a remarkably ineffective means of weight loss.

There is a general tendency, however, to fail to recognize the remarkable differences between different fats. Understanding the difference between omega-6 and omega-3 fats is critical for long term health.

For more detail on the information discussed here I would recommend an exellent book by Susan Allport entitled *The Queen of Fats.*

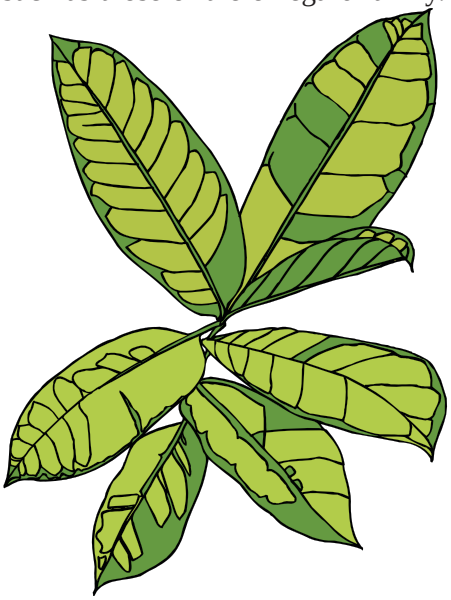
The Engine for Photosynthesis

The parent of the entire family of omega-3 fatty acids is alpha linolenic acid or ALA. This fat is found primarily in the leaves and other green parts of plants, and as such is the most abundant fat on earth.

ALA is the unique and dynamic fat which makes it possible for plants to capture photons of light from the sun and turn them into sugars. These sugars are the basis for all life on earth. This process is called photosynthesis.

ALA has three open spaces. It is in these open spaces that all the dynamic activity of fats takes place. The open spaces of fats can capture and hold electron clouds and oxygen.

These highly reactive fats are also prone to oxidation which turns the fats rancid and incapable of promoting life functions. ALA is also much more susceptible to hydrogenation or incorporation of extra hydrogen into its structure than other fats such as those of the omega-6 family.



Thus when plant oils are hydrogenated the omega-3 component is most readily susceptible to the process. One of the major problems with hydrogenation is that it destroys the omega-3 component of fats much more readily than the omega-6 or omega-9 components. Later we shall discuss the importance of the ratios of these different fats.

Super Fuel for Animal Metabolism

The ALA in plants is not adequate to maintain optimal health of animals. Animals need much greater mobility and their metabolic activity is much more rapid.

Animals have the ability to lengthen and add more double bonds to ALA and other fats. This makes the fats much more biologically active, but also increases the tendency of the fats to oxidize and turn rancid. This is why salmon will begin to smell and taste bad rapidly after the fish dies. This happens to plants as well, but much more slowly.

Animals can not synthesize ALA like plants can. The only way they can obtain it is by eating plants. Animals such as cattle which are not fed grass will not have optimal levels of ALA and will therefore tend to be deficient in the whole omega-3 family of fats.

Two of the eight members of the omega-3 family have been subjected

to extensive scrutiny. EPA is a long fat with 20 carbons and with five open spaces. This member of the omega-3 family becomes incorporated in cell membranes and provides one of the the raw materials with which cells can communicate with one another. These fat molecules are like smoke signals which carry messages from one cell to another.

EPA derived chemical messengers do not elicit powerful responses from tissues in the manner of other fats like arachidonic acid (AA) of the omega-6 family. Arachidonic acid serves as the fountainhead for two potentially damaging biochemical pathways. The first pathway leads to the production of inflammatory substances such as leukotrienes. Inflammatory substances are implicated in a wide variety of diseases including cancer, arthritis, asthma, allergies, and weight gain. The second pathway leads to the production of clotting substances such as thromboxanes. Overexpression of this pathway can set the stage for a heart attack.

DHA is the longest and most unsaturated of the fats in the omega-3 family. It is reserved for life's most complex and most rapid tasks. It is the most abundant fat in the brain and eyes. The second highest concentration of DHA is in the sperm to prepare them for the most important race in life. The third most abundant concentration is in the heart.

DHA will be found concentrated where life's most important tasks take place. It will be found in the flight muscles of birds, the flesh of fish that must cope with extremely cold temperatures without freezing, and the hooves of caribou that walk the frozen tundra.

Reference:

Allport, Susan, The Queen of Fats, Berkley: University of California Press, 2006, 13-14.

Eskimos

Our modern understanding of omega-3 fats began in 1969 when Olaf Bang read an article in the oldest medical journal in the world, a Danish publication. In this article a doctor observed that Eskimos died of infectious diseases, but appeared to have none of the heart problems so common in more civilized societies.

Bang and his colleague Jorn Dyerberg decided on the spur of the moment to go to Greenland and study the lipids in the blood of the Greenland Eskimos.

The researchers immediately noticed a difference in the blood of Eskimos. The blood of the average Dane stopped bleeding after 2-4 minutes. It took at least twice as long for the blood of Eskimos to stop bleeding.

The researchers realized that they were looking at a unique population group living by hunting and fishing, a means of livelihood which was rapidly disapearing, They realized the importance of recording information on the blood fats of the Eskimos and getting it into print before the diet of the Eskimos changed so radically that they were like everyone else.

The blood of the Eskimos proved to have one-seventh the arachidonic acid of the typical Dane and seven times the levels of an unknown fat which proved to be EPA. There was also a spike in another fat which proved to be DHA.

Reference:

Allport, Susan, The Queen of Fats, Berkley: University of California Press, 2006, 20-23.

Metabolic Rivalry

Ralph Holman who worked for the Hormel Institute famous for its highly saturated Spam conducted important research which revealed that arachidonic acid (AA) and eicosapentaenoic acid (EPA) compete with one another for incorporation into cell membranes. Whichever fat wins this rivalry determines whether the tissue hormones produced by the cells are potentially harmful or beneficial.

Linoleic acid, the parent of the omega-6 family of fats, also competes with linolenic acid, the parent of the omega-3 family of fats. The competition is for the enzymes that make the fats longer and more unsaturated. Omega-6 and omega-3 fats are metabolized by the same set of enzymes and they compete with one another at every step of the metabolic process.

Thus too much omega-6 in the diet will hinder the synthesis of EPA and DHA. Western diets are so high in omega-6 fats that there is in fact very little internal synthesis of EPA and DHA in many people. This is why supplementation with flax oil is no where near as effective as supplementation with fish oils.

One researcher comments, "As for the vegetable sources of Omega-3 fatty acids being superior, the evidence is quite to the contrary. While it is true

to say that vegetable Omega-3 polyunsaturates (chiefly alpha linolenic acid) are in theory capable of being converted to the effective Omega-3 fatty acid (eicosapentaenoic acid, or EPA), in practice the conversion is very ineffective. Sanders showed in 1983 that linseed oil, which contains 60% of its fatty acids in the form of alpha linolenic, had only a modest effect on platelet EPA levels."

Another researcher wrote, "Neither alpha-linolenic acid nor alpha-linolenic acid plus gamma-linolenic acid significantly enhanced eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) synthesis." The researcher goes on, "This article is very important because so much flaxseed oil (which contains alpha-linolenic acid in high quantities) is used, with the assumption that it will be converted to the long-chain omega-3 fatty acids DHA and EPA."

The failure to elevate levels of EPA with supplementation with flax oil is surprising. The body preferentially grabs onto the omega-3 ALA to make it longer and to open up spaces in the fat because it is a more biologically active fat than linoleic acid (LA).

The failure to raise EPA levels says a lot about the diet of the average individual. Our diets are so loaded with fats other than those of the omega-3 family that even when we supplement with the precursor of the active omega-3 compounds the body fails to synthesize them. Among the most harmful fats are the trans fats or partially hydrogenated oils which interfere with the desaturation and elongation enzymes the body produces.

Other factors such as high intake of sugar and alcohol and deficiency of nutrients like vitamin B6 and zinc can play a role in contributing to inhibition of synthesis of these important fats.

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Allport, Susan, The Queen of Fats, Berkley: University of California Press, 2006, 38.

Ray Rice MS, Ph.D., AIFST, Principal, Reapers Cunsultancy (Service to the Health Food Industry), Tiverton, Devon.

Sanders, T.A.B., and Roushaniai, T., *Clinical Science*, 1983; 64, 91-99.

Brouwer, DAJ, et al., "GammaLinolenic Acid Does Not Augment Long-Chain Polyunsaturated Fatty Acid omega-3 Status," *Prostaglandins Leukot Essent Fatty Acids*, 1998; 59(5):329-334. Quote from *Clinical Pearls News*, April 1999, p. 69.

Oxidation

The powerful contribution omega-3 fats make toward overall health comes with a potential hazard. The tendency for a fat to oxidize or turn rancid is proportional to the number of open spaces or double bonds in the fat. This tendency to rancidity increases exponentially with the number of open spaces.

This is why foods rich in high quality omega-3 fatty acids have a short shelf life and spoil rapidly. The primary purpose of a good deal of food processing is to remove the high quality lipids because it is these very substances which reduce the shelf life of foods.

Extending shelf life has made large industrial food processors as rich as Midas, but it has destroyed the health of any people consuming these foods. It is foods with a long shelf life which has created a health care crisis in the United States and this problem will not go away by spending more on health care (or more correctly disease care).

Health care costs will only decline when human beings begin to nourish the complicated machinery of the body with the building blocks necessary for the maintenance of health.

Triglycerides

The body moves liquid oils around in the form of triglycerides. Triglycerides can contain a great number of fats. A vegetable oil like soybean oil can contain 9 different oils. By contrast triglycerides in fish oils contain as many as 50 different fatty acids.

A triglyceride consists of a glycerol foundation structure to which are attached three fatty acids. The behavior or function of a triglyceride depends upon which fatty acids are attached to the glycerol backbone. Straight, sluggish fats result in triglycerides which stick together. Incorporation of omega-3 fatty acids into the triglyceride structure totally changes the behavior of the molecule.

Omega-3 fatty acids, particularly EPA and DHA, are very long and they have a kinky or twisted tail which vibrates as much as 100 million times a second. This makes it very difficult for fats to stick together.

Buter and lard are primarily short fats which tend to stick together. Fish oils are very long fats which repel one another. This very characteristic of fish oils made them difficult to research in the laboratory. Olive oil with its one double bond will solidify when placed into the refrigerator. DHA with its six double bonds is virtually impossible to solidify or crystalize even at the lowest of temperatures. The dynamic activity also causes rapid shifts in structure of the fats.

This failure to solidify makes EPA and DHA a godsend for penguins in Antarctica and polar bears in the Arctic, but it created a migraine headache for Ralph Holman who undertook the task of identifying the structure of the omega-3 fats.

An additional problem was that the attempt to crystalize the ome-

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ga-3 fats almost invariably changed the structure and activity of the fats. A hydrogenated omega-3 fatty acid is a totally different compound from a natural omega-3 fat.

MEAD'S ACID: THE BEST THE BODY CAN DO

Animals fed a fat-free diet manufacture a fat called Mead's acid. This is manufactured from oleic acid, an unsaturated fat that animals can manufacture themselves. This fat is found only in fat deprived animals and is considered a marker for malnutrition. The lower the fat intake the greater the quantities of Mead's acid one will tend to find in a human being.

This unsaturated fat is of very poor quality, but the body will incorporate this fat into critical structures if other unsaturated fats such as linolenic and linoleic acids are unavailable. This is the ultimate consequence of a low-fat diet and it is not a health-promoting scenario. The lesson is that the body will build the healthiest tissues it can with the raw materials which it has available. A fat-free diet is neither desirable nor healthy.

The problem of infant eczema emerged in the 1940's when parents began to give infants skim milk and sugar as a substitute for mother's milk. Ralph Holman found that this condition often improved when the intake of essential fatty acids was increased by the addition of animal fats to the diet.

It is my belief that the problems commonly associated with fats today are more likely due to either excess sugar intake or to diets which have excess quantities of the wrong kinds of fats and deficiencies of the proper kinds of fats. By simply changing the foods we eat and practicing simple supplementation it is possible to alter the exaggerated inflammatory patterns which are commonly found in individuals consuming modern highly processed diets.

One simple change which is highly beneficial is the incorporation of more leafy green foods into the diet. These foods are natural sources of omega-3 fats. Consumption of animals which have been eating grasses and leaves is also beneficial.

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