

# Rationale For Nutritious Fats & Oils

## Essential Fatty Acids

Essential fatty acids are those fatty acids the body is incapable of synthesizing on its own in sufficient quantities to meet metabolic demands. In contrast with dietary fat used for fuel, cushioning of organs, and as a vehicle for absorption of fat-soluble nutrients, essential fatty acids play critical roles in cell and organelle membrane structure and a wide array of physiological processes through eicosanoid modulation.

Cell and organelle membranes consist of a lipid bilayer (see Figure 1). This lipid bilayer is composed primarily of phospholipids which contain within their structure an assortment of fatty acids that is somewhat indicative of dietary fat intake. The more saturated the fatty acid content of the phospholipids, the more rigid these membranes tend to be and the lower their efficiency in terms of membrane biodynamic function.

Essential fatty acids, like linoleic and linolenic, are unsaturated fatty acids. These fatty acids are much more fluid by nature and thus contribute to transmembrane dynamics more effectively than do saturated fatty acids or the trans fatty acids that can occur in processed oils. Within the membrane, protein molecules contribute to forming “fluid” electron passageways for the flow of oxygen and fuel into and out of cells and organelles. (Unsaturated essential fatty acids contribute by forming pi electron clouds with the sulfur groups associated with proteins in membrane structures.) Evidence observed in several species, including humans, suggests that pathology can result from long-term fatty acid malnutrition. If membrane structures are not sufficiently supplied with the proper fatty acids, they will not perform with maximum efficiency. This provides part of the rationale for the use of properly formulated and protected essential fatty acid formulas that can help swing the balance of fatty acid membrane structure to a more healthful state.

## The Beneficial Eicosanoids

Essential fatty acids are also capable of being transformed into a variety of more complex, unsaturated fatty acids known as eicosanoids which play extremely important and active roles in the moment-by-moment regulation of metabolic activities at the microcellular and tissue levels (see Figure 2). These regulatory eicosanoids parallel the actions of enzymes on a biochemical level, and hormones on an organ level. Compounds such as thromboxanes, prostaglandins, leukotrienes, and lipoxins comprise some of the important biochemical members of the eicosanoid family which are derived from essential fatty acids. Eicosanoids function both to turn on and turn off processes which activate certain metabolic events as well as to limit these metabolic events. Such timing of life

## NUTRITIOUS OILS

W Y S O N G

### **E.E.A.™**

A dietary supplement providing a wide range of unaltered essential fatty acids (including omega-3s, -6s and -9s) known to exert numerous beneficial structural and metabolic effects. Uniquely stabilized with Oxherphol™. Available with fish oil, or plant-derived.

#### **E.E.A. (with Fish Oil)**

*Ingredients:* Fish Oil, Pumpkin Seed Oil, Flax Seed Oil, Perilla Oil, Rice Bran Oil, and Borage Oil stabilized with Wysong Oxherphol™ antioxidant.

#### **E.E.A. Plant-Derived™**

*Ingredients:* Flax Seed Oil, Pumpkin Seed Oil, Perilla Oil, Rice Bran Oil, and Borage Oil stabilized with Wysong Oxherphol™ antioxidant.

*Capsule Ingredients:* Natural Phytonutrient Extracts and Concentrates of Flax Seed Oil, Evening Primrose Oil, Canola Oil, Black Currant Oil, and Pumpkin Seed Oil.

### **MARINE LIPIDS™**

EPA & DHA omega-3 fatty acids from cold-water fish.

*Ingredients:* Cold Water Fish Oil.

### **FRESH SQUEEZED FLAX SEEDS™**

High omega-3 flax seed oil with whole ground seeds.

*Ingredients:* Organic Flax Seeds, Lecithin, Wysong Oxherphol antioxidant.

### **HERBED EXTRA VIRGIN OLIVE OIL™**

A nutritious herbal olive oil used as a dressing/spread for bread, pastas, and salads. High in healthful omega-9 oils.

*Ingredients:* Cold Pressed Organic Extra Virgin Olive Oil, Rosemary, Fennel Seed, Peppercorns, Wysong Oxherphol antioxidant.

### **COCONUT BLEND™**

A delicious blend of healthful coconut, pumpkin and flax oils with Oxherphol antioxidant.

*Ingredients:* Coconut Oil, Pumpkin Seed Oil, and Flax Seed Oil, Wysong Oxherphol antioxidant.



## BILIPID CELL MEMBRANE

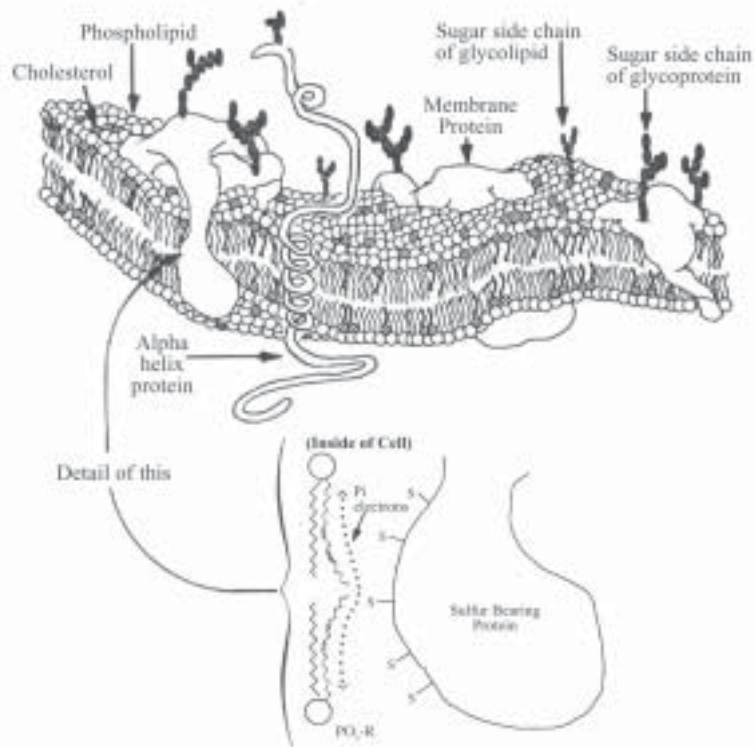


Figure 1. Phospholipids containing *cis*- essential fatty acids share pi electrons with proteins to effect energy transfer through biological membranes.

processes is one of the most unique characteristics of life and, in fact, is an important criterion for differentiating life from non-life.

### Destruction/Protection of Essential Fatty Acids

Many natural foods contain essential fatty acids that are naturally protected and present in appropriate ratios for optimal nutrition. However, once a natural food product is, so to speak, cut from the vine, its inherent nutrient value immediately begins to decrease. Vitamins and minerals can be lost, proteins and carbohydrates can degrade and isomerize, and fatty acids can slowly oxidize and diminish in nutritional value. Fatty acids in particular are especially susceptible to such degradation because they are highly reactive compounds prone to oxidation. The oxidation process is accelerated considerably in the presence of heat or light.

Within the natural plant product, fatty acids and oils are somewhat protected from oxidation due to built-in antioxidant systems present within the plant tissue. These naturally existing antioxidants include such components as vitamins E, C and A, various enzyme systems, certain mineral chelators, and the physical protection provided by the natural shell of the plant itself. But once these fatty acids and oils are removed from these factors and subsequently rendered unprotected, they become highly unstable and can quickly lose their nutritional value and even form compounds, such as free radical species, which can be toxic. Couple this with the fact that modern monoculture farming practices do not build nutrient value into crops but instead usually focus simply on crop yield. With the extreme vitiating effects of modern food processing, it is not surprising the original nutritional profile can be greatly compromised.

### Processing's Role

Thus, it is important that any food substance that contains essential fatty acids be minimally processed in a manner that helps protect these nutrients until they are consumed. One step in this direction is simply to use whole grain products since the nutrients that protect the fat while it is "on the vine" can also serve to protect the fatty acids in a food product. Additionally, supplemental, natural, antioxidant systems can be used to protect these fatty acids. Wysong Oxherphol™, which is a combination of specific vitamin E epimers and oleoresins from certain herbs, enzymes, and chelators, has been proven to have the capability of stabilizing fatty acids against oxidative degradation.

When food products are vigorously processed as is common today, fatty acids can form compounds that actually interfere with the body's ability to generate biochemicals that are complementary to health. Hydrogenation of oils changes essential fatty acids to simply calorie-containing fats and also can inhibit enzyme systems that help change essential fatty acids into valuable eicosanoids. Heat, light, and various other forces resulting from processing can dramatically isomerize and oxidize the fatty acids thus limiting their ability to exert their essential role in the body.

Thus, such diets fed over time can result in a variety of essential fatty acid deficiency manifestations including:

1. Loss of ability to maintain body temperature.
2. Dry hair and skin.
3. Impaired energy metabolism.
4. Eczema.
5. Gallstones.
6. Vascular pathology.
7. Immune dysfunction ... and more.

(Added to this list are the previous functions of eicosanoids since these

Organ System	Effects	Species Involved <sup>a</sup>	Organ System	Effects	Species Involved <sup>a</sup>
<b>Prostanoids</b>			<b>Leukotrienes</b>		
Blood vessels	Vasodilation Vasoconstriction	PGI <sub>2</sub> > PGI <sub>3</sub> > PGE <sub>1</sub> TXA <sub>2</sub>	Bronchioles	Constriction	LTC <sub>4</sub> , LTD <sub>4</sub>
Platelets	Adhesion Aggregation Antiaggregatory	TXA <sub>2</sub> PGI <sub>2</sub> > PGI <sub>3</sub> > PGE	Ileum	Constriction	LTC <sub>4</sub> , LTD <sub>4</sub>
Lung	Bronchiole constriction Bronchiole dilation	PGE <sub>2</sub> , TXA <sub>2</sub> , PGD <sub>2</sub> PGE <sub>2</sub> , PGI <sub>2</sub>	Vascular	Constriction Permeability	LTC <sub>4</sub> , LTD <sub>4</sub> LTC <sub>4</sub> , LTD <sub>4</sub>
Kidney	Glomerular filtration rate Renin secretion Natriuresis Diuresis	PGE <sub>2</sub> , PGI <sub>2</sub> , TXA <sub>2</sub> PGI <sub>2</sub> , PGF <sub>2</sub> PGE <sub>2</sub> , PGI <sub>2</sub> PGE <sub>2</sub>	Pancreas	Insulin secretion	LTB <sub>4</sub> , HETE
Stomach	Acid secretion	PGE <sub>2</sub> , PGE <sub>1</sub>	Neutrophils	Adhesion Chemotaxis Chemokinesis Lysozyme secretion	LTB <sub>4</sub> LTB <sub>4</sub> , HETE
Small intestine	Peristalsis	PGE <sub>2</sub> , PGF <sub>2</sub>	Monocytes	Chemotaxis Chemokinesis	LTB <sub>4</sub> , HETE
Pancreas	Amylase secretion Insulin secretion	PGE <sub>2</sub> , PGI <sub>2</sub> PGE <sub>2</sub>	Basophils	Histamine secretion	LTB <sub>4</sub> , HETE
Hypophysis	Secretion and growth Hormone adrenocorticotrophic	PGE <sub>2</sub>			
Tissue	Pain Cytoprotection	PGE <sub>2</sub> PGI <sub>2</sub> , dimethyl PGE			

<sup>a</sup>PG = prostaglandin; PGI<sub>2</sub> = prostacyclin; TXA = thromboxane; LT = leukotriene; HETE = hydroxyeicosatetraenoic acid

Figure 2. Essential fatty acids are converted to eicosanoids, which have numerous vital metabolic functions.

compounds are derived from essential fatty acids.)

### **Omega-6: Omega-3 Balance**

Another consideration in essential fatty acid nutriture is the shift that has occurred in the balance of essential fatty acids since the Industrial Age. With the scaling up to mass feeding and the use of easily cultivated southern latitude high-yield grains, linoleic acid (LA), an omega-6 fatty acid, has become predominant in the diet. In contrast, the consumption of linolenic acid (LNA), an omega-3 fatty acid, has been proportionately reduced. The resultant imbalance is significant since it is the eicosanoids generated from omega-3 fatty acids which are believed to be able to exert a variety of beneficial effects to cancel and balance potential pathological effects of excess omega-6 fatty acids.

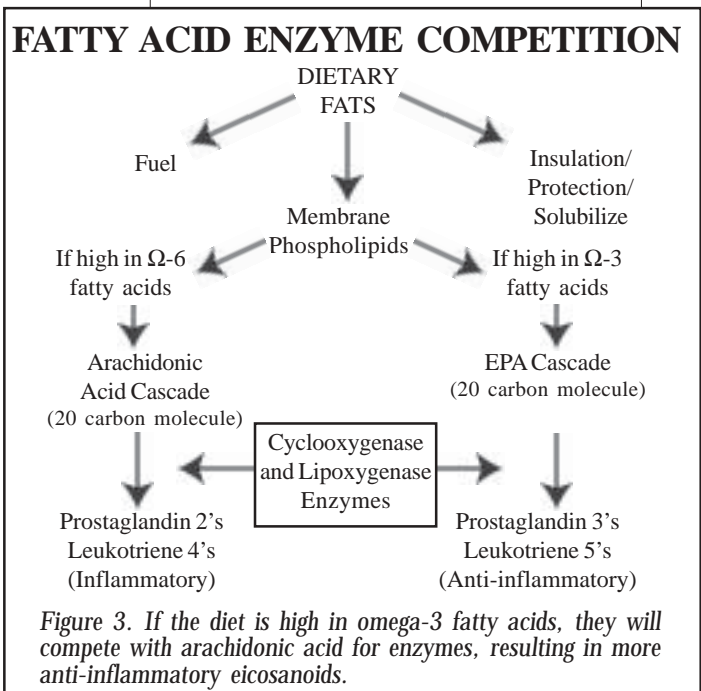
For example, the eicosanoid thromboxane has the ability to cause platelet aggregation and

clot formation whereas the eicosanoids produced by the omega-3 family fatty acids tend to reverse these effects by increasing clotting time and decreasing coagulation factors, including viscosity of blood. Thus if the omega-6 fatty acids predominate in the diet, the chance for vascular damage and circulatory difficulties increases compared to what would occur if sufficient omega-3 fatty acids were present in the diet. This is the basis for the present

popular suggestion that fish oils, which are rich in omega-3 fatty acids, be included and increased in the human diet. The omega-3 fatty acids have the capability of competing for and using the same enzyme system that converts omega-6 fatty acids into eicosanoids and thus can shift the balance to a more favorable state. By increasing the ratio of omega-3 to omega-6, there is a competition for enzymes to produce more of the beneficial effects of the omega-3 eicosanoid family, such as:

- Anti-arrhythmic (prevents irregular heartbeat)
- Anti-atherosclerotic (prevents arterial plaque build-up)
- Anti-inflammatory
- Improves endothelial function
- Lowers blood pressure

Similarly, a variety of inflammatory and allergic disorders, including asthma and inflammatory bowel disease, can be related to improper fatty acid nutriture. The consumption of oxidized fats, as well as the imbalance of omega-6 to omega-3 fatty acids, can result in a variety of cellular disorders.



This can be linked to the overproduction of eicosanoids, which are inflammatory, and the underproduction of eicosanoids, which are anti-inflammatory. The omega-3 fatty acids compete for enzyme systems which would normally convert omega-6 fatty acids into pro-inflammatory products (see Figure 3).

***Biological Benefits of GLA***

Interestingly, not all omega-6 fatty acids behave the same. The western diet also contains extremely low amounts of Gamma Linolenic Acid (GLA). The use of Evening Primrose Oil, Borage Oil, Canola Oil and Black Currant Oil in Wysong's E.F.A. Plant-Derived™ has primarily been chosen to deliver optimal levels of GLA (see Figure 4) with documented beneficial physiological effects. Although GLA can be synthesized from LA, evidence suggests that normal aging and multiple dietary and disease conditions may interfere with this bioconversion, thereby reducing pools of GLA metabolites, such as dihomogammalinolenic acid (DGLA) in membrane phospholipids. DGLA, derived directly from these GLA containing oils produces eicosanoids that have important anti-inflammatory effects. Thus GLA has been shown to mediate numerous health and disease states, including PMS, arthritis, skin health, diabetes and cardiovascular disease.

Plant Source	GLA - Weight % of Fatty Acids
Black Currant	15 to 20
Borage	20 to 25
Evening Primrose	8 to 14
Canola Oil	36 to 40

Figure 4. Concentrated Sources of GLA

Omega-3 fatty acids, especially those from perilla and fish oil, have been shown to enhance brain function and maintain the blood-brain barrier, which increases longevity. A study has shown that omega-3 deficient rats supplemented with perilla oil had marked improvement in brightness discrimination learning tests.

Eicosapentaenoic acid (EPA), found naturally in fish oil, has been shown to be beneficial to patients with persistent depression, schizophrenia, and Alzheimer's disease due to its role in neurotransmission. Docosahexaenoic acid (DHA), also found in fish oil, is necessary for proper brain development and is thus a crucial nutrient during pregnancy.

Several essential fatty acid oils, including perilla oil and flax seed oil, have been shown to protect against certain types of cancer. Several studies have shown perilla oil inhibits tumor proliferation in colon and mammary carcinogenesis. Flax seed oil contains phyto-estrogens and lignans, which are similar in structure to estrogen. These natural components help to reduce breast cancer risk by improving estrogen metabolism.

The common clinical finding of dry skin and other problems associated with E.F.A. (essential fatty acid) deficiency is explained by similar mechanisms. Eczema, pruritus, atopy, and hyperkeratosis are controlled by biochemicals related to fatty acid intake. Prostanoids, leukotrienes and lipoxins that are pro-inflammatory can

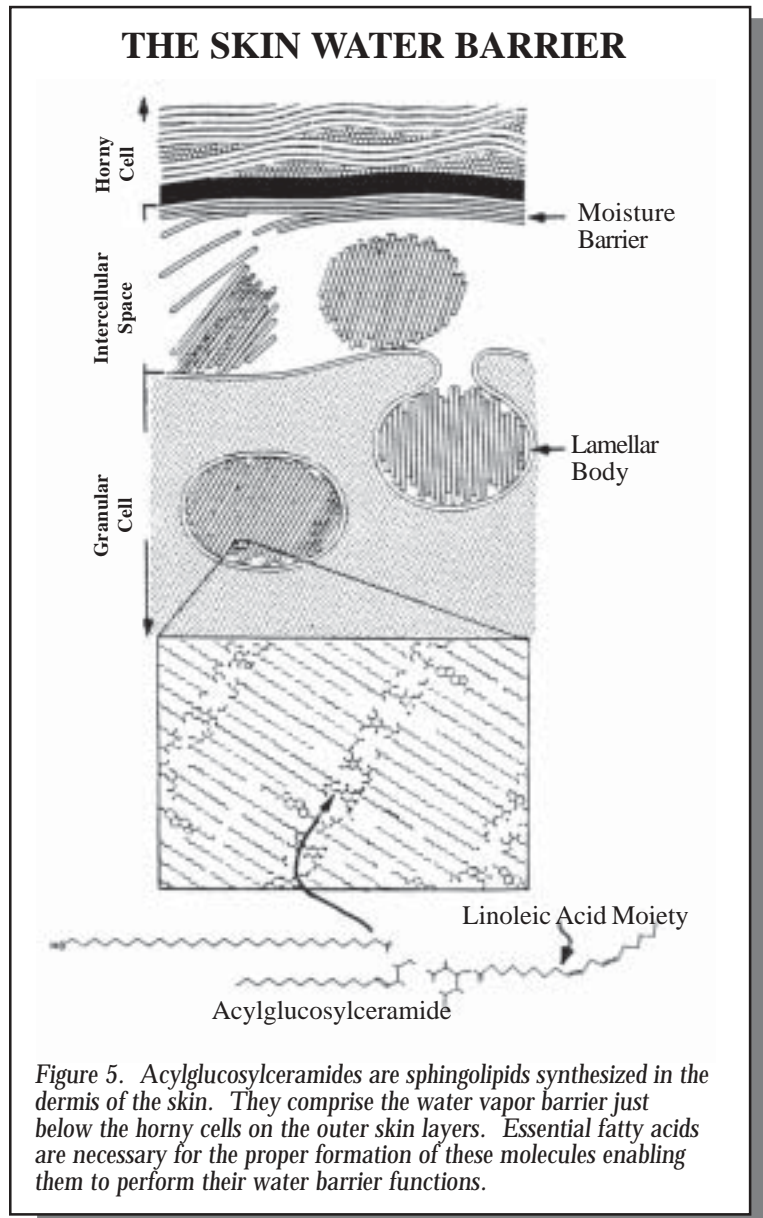


Figure 5. Acylglucosylceramides are sphingolipids synthesized in the dermis of the skin. They comprise the water vapor barrier just below the horny cells on the outer skin layers. Essential fatty acids are necessary for the proper formation of these molecules enabling them to perform their water barrier functions.

be increased or decreased depending upon the types of fatty acids consumed. Additionally, transepidermal water loss is affected by the makeup of a particular sphingolipid that exists between the granular and horny layer of the skin. If linoleic acid is not associated with this lipid layer in sufficient amounts, increased water will leak through the skin resulting in dryness and even increased water consumption (see Figure 5).

***Omega-9 Fatty Acids***

In addition to valuable omega-3s and -6s, Wysong oils also contain omega-9 fatty acids to round out the range of healthful dietary fatty acids provided by Wysong oils. Omega-9s

are derived from various natural sources including gently processed extra-virgin olive oil and high oleic safflower oil. Extra-virgin olive oil results from the first pressing of olives and is the most flavorful of the olive oils. These monounsaturated oils have been shown to be not only highly nutritious, but remarkably stable at high temperatures which make them especially useful for cooking purposes.

More important to health, however, is the unfolding correlation between consumption of omega-9s and improved cardiovascular health. Numerous medical studies have provided evidence which demonstrates that intake of omega-9s can help lower serum cholesterol levels. Such significant findings further reinforce the importance of including a healthful balance of omega-3, -6, and -9 fatty acids in the diet.

### **Short and Medium Chain Triglycerides**

Although it has been popularly believed that saturated fats are adverse to health, the science underlying this claim is faulty for a host of reasons (See [Lipid Nutrition – Understanding fats and oils in health and disease](#)), not the least of which is the fact that saturated fats are found in all natural foods. We would therefore expect them to contribute to health and that is exactly what they can do—in moderation and in their natural form.

Coconut Blend™ has been created to provide a spectrum of healthful fatty acids, including flax omega-3s (“fish oil factor”), reproductive and prostate healthy pumpkin sterols, and short and medium chain triglycerides from coconut.

Details of the clinical research and biochemistry proving the benefits of these healthy fats are described in the above-cited book. The negative press for saturated fats and/or coconut oil is based upon faulty evidence and is promoted by the hydrogenated fat

industry. (There is substantial proof, on the other hand, of the dangers of artificially produced hydrogenated fats.) The particular evidence for the advantages of the shorter chain saturated fats found in coconut indicates that coconut oil:

1. Decreases adipose tissue and increases fat oxidation. MCTs (Medium Chain Triglycerides) have a sparing effect on fat-free tissue mass, thus encouraging muscle tissue growth and repair. The bottom line is less depot fat and more muscle.
2. Unlike other types of fat, MCTs are absorbed directly from the small intestine into the liver, which makes them available for quick energy use and prevents deposition into adipose tissue.
3. MCTs have about 10% less calorie content than other fats due to their biochemical make-up and increased thermogenesis. In effect, the digestion of MCTs uses more energy, thus decreasing energy available for deposition as fat. Thus we actually have a form of fat that can be beneficial in a weight-reducing program!
4. Increases satiety, decreases appetite, and therefore helps control weight.
5. Reduces the white, subcutaneous fat (as opposed to the brown fat surrounding internal organs) by stimulating uncoupling protein 1 (UCP1).
6. Contains specific fatty acids, such as lauric acid and capric acid, which have proven antimicrobial activity. Lauric acid is converted in the body to monolaurin, a monoglyceride shown to inactivate bacteria, yeast, fungi, and enveloped viruses by disrupting their lipid membranes. Fully 80% of the fatty acids in

coconut have antimicrobial activity, including action against food-borne pathogens.

7. Boosts the function of the immune system.
8. Is therapeutic against the bacteria causing acne.
9. Acts against the stomach ulcer bacterium, *Helicobacter pylori*.
10. Is probiotic by helping to promote the proliferation of beneficial intestinal bacteria.
11. Is beneficial for HIV and AIDS.
12. Is beneficial against yeast infections such as Candida.
13. Protects against cancer-causing compounds (carcinogens) such as nitrosamines, benzpyrene, and azaserine.
14. Improves blood lipid profiles by increasing HDL cholesterol and decreasing LDL cholesterol.
15. Is anti-inflammatory, which is important in decreasing the risk of cardiovascular disease, Crohn’s disease, prostate disease, and inflammatory bone and joint diseases such as arthritis.
16. Mother’s milk, the ideal human food, is rich in lauric acid, the predominant saturated fat in coconut.

### **Summary**

The above is a very general description of the role of essential fatty acids in health. This is an extremely complex subject rapidly unfolding in the scientific literature.

When a thorough review of these matters is made, it becomes apparent that the underlying cause of many health disturbances may be linked directly to the alteration of the natural diet. Therefore, by increasing natural factors in the diet, protecting them against degradation and imbalances, as well as restoring quality and balance to the foods we consume, a more

appropriate nutritional profile can occur. Essential fatty acids that are minimally processed, cold-pressed, and derived from whole grains can provide many health benefits. Such supplements should also be stabilized with natural antioxidants and protected from heat, light, and air to prevent rancidity and oxidation. Improving fatty acid nutrition provides an excellent method for helping to retard the degenerative diseases that can result from a lifetime of consuming improperly balanced fatty acids and toxic products resulting from manipulation and exposure to environmental forces.

Wysong E.F.A.™, E.F.A. Plant-Derived™, E.F.A. Capsules, Marine

Lipids™, Fresh Squeezed Flax Seeds™, Herbed Extra Virgin Olive Oil™, and Coconut Blend™ provide supplementation of specific fatty acids including omega-3s, -6s, and -9s from fish oil, cold-pressed flax seed oil, rice bran oil, perilla, extra virgin olive oil, borage oil, evening primrose oil, canola oil, black currant oil, coconut and pumpkin seed oil. Special processing is used to exclude oxygen and minimize nutrient damage. Wysong's natural antioxidant Oxherphol™ helps deliver stabilized, active, natural, essential fatty acids to the diet. Additionally, Wysong ingredients are selected to achieve a balance of omega-3 fatty acids to omega-6 fatty

acids to shift fatty acid metabolism toward the original diet and more natural form.

In summary, whole food sources, careful processing, natural stabilization, and an increase in the omega-3 to omega-6 ratio are key to lipid nutrition. For a more thorough discussion on lipid nutrition, obtain the book Lipid Nutrition, Understanding Fats and Oils in Health and Disease by Dr. R. L. Wysong from Wysong Corporation.

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.*

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