MD+ EFA+ Version V

Essential Fatty Acids – Plus

EFA+ is an enhanced essential fatty acid formulation containing optimum levels of the essential fatty acids as well as dozens of other additive and synergistic ingredients.

Besides the essential fatty acids, EFA+ also contains more than 2 dozen other ingredients that along with the essential fatty acids provide a host of benefits including:

- **Decreasing inflammation**
- **Decreasing the incidence and effects of bacterial, fungal, and viral infections**
- **Decreasing the adverse effects of pollution**
- **Weight and fat loss**
- **Anabolic synergism**
- **Improvements in body composition**
- **Enhancing exercise/sports performance**
- **Increased well-being and cognition**
- **Peripheral and Central Neuroprotective effects from endogenous and exogenous toxins, infections, and pollution.**
- **Increasing lifespan and healthspan.**

https://metabolicdiet.com/product/efa/ Updated October 5, 2021, by Mauro Di Pasquale, B.Sc. (Hons), M.D.

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EFA+ and Covid-19

There's been studies showing that eicosapentaenoic acid and docosahexaenoic acid and other nutrients in EFA+ bolster the immune

system and can protect against and help recovery from viral infections, such as the coronavirus responsible for the present Covid-19 pandemic.[12]

Nutrients. 2020 Apr 23;12(4). pii: E1181. doi: 10.3390/nu12041181.

Optimal Nutritional Status for a Well-Functioning Immune System Is an Important Factor to Protect Against Viral Infections

Philip C Calder[1], Anitra C Carr[2], Adrian F Gombart[3], Manfred Eggersdorfer[4]

Abstract

Public health practices including handwashing and vaccinations help reduce the spread and impact of infections. Nevertheless, the global burden of infection is high, and additional measures are necessary. Acute respiratory tract infections, for example, were responsible for approximately 2.38 million deaths worldwide in 2016. The role nutrition plays in supporting the immune system is well-established. A wealth of mechanistic and clinical data show that vitamins, including vitamins A, B_6, B_{12}, C, D, E, and folate; trace elements, including zinc, iron, selenium, magnesium, and copper; and **the omega-3 fatty acids eicosapentaenoic acid and docosahexaenoic acid play important and complementary roles in supporting the immune system.** Inadequate intake and status of these nutrients are widespread, leading to a decrease in resistance to infections and as a consequence an increase in disease burden. Against this background the following conclusions are made: (1) supplementation with the above micronutrients and omega-3 fatty acids is a safe, effective, and low-cost strategy to help support optimal immune function; (2) supplementation above the Recommended Dietary Allowance (RDA), but within recommended upper safety limits, for specific nutrients such as vitamins C and D is warranted; and (3) public health officials are encouraged to include nutritional strategies in their recommendations to improve public health.

Full text available at: **https://www.mdpi.com/2072-6643/12/4/1181/htm**.

The one problem that I found in this paper is the amount of omega-3s recommended. It's been my thinking that more than their recommended amount (250 grams of EPA and DHA) is needed for the full immune response. This thinking is the reason that the amount in EFA+ is much higher and more in line with the amounts of n-3 PUFA that are needed to provide the immune, CVS, and other benefits, given also the additive and synergistic effects of the other ingredients in EFA+..

In line with my thinking a comment made on this paper supports my thoughts on appropriate doses of n-3 PUFA. You can find the full paper published on August 2, 2020 at **https://www.mdpi.com/2072-6643/12/8/2321/htm**.

The information presented below focuses on the basics of the essential fatty acids, and on the specifics of the ingredients in EFA+. For more detailed information on Essential Fatty Acids see my published article – the Essentials of Essential Fatty acids – PubMed -

https://www.ncbi.nlm.nih.gov/pubmed/22435414 (The essentials of essential fatty acids. Di Pasquale MG. J Diet Suppl. 2009;6(2):143-61.)

EFA+ version V Nutritional Panel

Supplement Facts:

Serving Size: 6 Softgels
Servings Per Container: 30

	Amount Per Serving	% Daily Value
Calories	48	
Calories From Fat	48	
Total Fat	5.3 g	8%
Vitamin A (as Palmitate)	3000 IU	60%
Vitamin C (as Ascorbic Acid and Calcium Ascorbate)	200 mg	335%
Vitamin D3 (as Cholecalciferol & Calcifediol)	400 IU	100%
Vitamin E (as d-Alpha Tocopherol Succinate)	200 IU	665%
Vitamin B3 (as Niacinamide & Inositol Hexanicotinate)	20 mg	100%
Vitamin B6 (as Pyridoxine HCL & Pyridoxal-5-Phosphate)	15 mg	750%
Zinc (as Zinc Monomethionine Aspartate)	15 mg	100%
Total Omega-3 Fatty Acids (as EPA, DHA, and ALA)	2580 mg	*

	Amount Per Serving	% Daily Value
Omega-3 Fish Oil (Ultra High Concentrate)	2650 mg	*
EPA (Eicosapentaenoic acid)	980 mg	
DHA (Docosahexaenoic acid)	760 mg	
Flaxseed Oil	1500 mg	*
GLA (Gamma Linoleic Acid) (Borage Oil Extract)	500 mg	*
Conjugated Linoleic Acid (CLA)	300 mg	*
Alpha Lipoic Acid	150 mg	*
Acetyl-L-Carnitine	150 mg	*
Glutathione (Reduced)	100 mg	*
Astaxanthin	950 mcg	*
EFA+™ Proprietary Complex	1690 mg*	

Olive Oil, Krill Oil, Glycerophosphocholine (Alpha-GPC), Choline, Citicoline (CDP-Choline), Phosphatidylcholine, Phosphatidylserine, Inositol, Methionine, Policosanol, Serine.

Other Ingredients: Gelatin, Vegetable Glycerin, Water, Natural Color.

*Daily Value Not Established

The many benefits of EFA+ include:

1. **Effects on body composition – improved metabolism, increased insulin sensitivity, enhanced weight loss mostly as fat loss, and retention of muscle mass, with anabolic effects leading to synergistic effects on increasing muscle hypertrophy and strength.**
2. **Improved intensity of training and decreased fatigue.**
3. **Improved recovery from intensive training and injury.**
4. **Maintenance of muscle mass and strength with immobilization secondary to injury and surgical procedures.**
5. **Decreased inflammation in the body thus providing cardiovascular, neural, musculoskeletal, and hormonal (including testosterone and growth hormone) health benefits.**
6. **Improved immune system functioning.**
7. **Improved serum lipid (cholesterol, triglycerides) profile including cholesterol levels.**
8. **Improved mental health, cognition, and retention of brain matter.**
9. **Anti-aging effects, both physical and mental.**
10. **Neuroprotection by decreasing inflammation, supplementing needed anti-oxidant effects, and by preserving the blood-brain barrier.**

The information below on the new EFA+ version V is in draft form and is expanded and revised over time as new information comes to light. For now, this latest information will give you the flavor of just what EFA+ will do for you in helping you achieve your health, body composition and performance goals.

Dietary Fats and Essential Fatty Acids

Introduction

Dietary fats are essential for normal metabolism and good health. Not only are they necessary for the proper absorption, transportation and function of the fat-soluble vitamins A, D, E, and K, fats are used by the body to produce cellular components, hormones and other compounds that are essential to the proper functioning of the body. As well, a moderate intake of fat is essential for maximizing body composition and decreasing body fat.

But while all fats, including saturated fatty acids, have an important role in energy metabolism and body functions, the most important fats are the essential fatty acids (EFAs) since the body needs them to survive.

While the human body can manufacture most of the fats it needs from other fats, carbohydrates and protein, including cholesterol, saturated fatty acids and unsaturated fatty acids, there are two groups of fatty acids, called essential fatty acids, based on linoleic acid (omega 6 group – which includes

GLA) and alpha-linolenic acid (omega 3 group which includes EPA and DHA), which cannot be manufactured in the body.

The body cannot make an omega-3 or omega-6 fatty acid because human metabolism cannot add a double-bond to a fatty acid that is more than 9 carbons away from the delta end. For the same reason, the body cannot interconvert omega-3 and omega-6 fatty acids.

Unfortunately, for various reasons, many people, including athletes, are EFA challenged showing mild to moderate deficiencies in EFAs. Studies have shown that increasing EPA and DHA intake would be advantageous for improved health, body composition, strength, physical and mental performance under demanding circumstances, and in the prevention of several negative consequences of aging.[3456789101112131415161 7]

EFA Deficiency

EFAs, especially the omega-3s (including DHA and EPA) are frequently deficient in modern diets.[18192021222324] Part of the problem is the food that's given to livestock and poultry, which is a lot different from the natural food that these animals would normally consume in the wild or even in the past.

So, while both omega-3 (alpha-linolenic acid) and omega-6 (linoleic acid) are plentiful in the leafy plants consumed by roaming animals, providing nearly equal ratios of these EFAs, that's no longer the case when they're switched from grass to grains. The result is that the fat in wild game and grazing ruminant contains roughly seven times more omega-3 fatty acids than animals raised for commercial meat.

Another reason is that processing or cooking changes healthy EFAs into unhealthy trans-fatty acids. As such, the meat and eggs that we consume today that's already low in omega-3s is even more depleted once it reaches our tables.

As well, we consume a lot of vegetable oils most of which are rich in omega-6 fatty acids and poor in the omega-3s.

The increased omega-6/omega-3 ratio common to our modern diets, but not to man during most of his existence, can give rise to disturbances in cellular structure and function, and an increase in systemic inflammation, which can lead to dysfunction and disease.[25]

The consequences of maternal omega-3 deficiency, whether dietary or constitutional, is especially worrisome in in prenatal women duet to the potential for both epigenetic and transgenerational epigenetic consequences.[26272829]

So, although you can get the EFAs you need from food, you must know what you're doing and what you're eating (and perhaps more importantly what you're eating was eating), and even then, although you're trying to eat right, you likely will still need to supplement your diet with some of the essential fatty acids.

Omega 3 Fatty Acids

The omega-3s like alpha-linolenic acid (LNA) and eicosapentaenoic and docosahexaenoic acids (known as EPA and DHA respectively) increase fatty acid oxidation (burning of fat), basal metabolic rates, and lower cholesterol.

Omega-3 fatty acids also provide an anabolic effect by increasing the binding of IGF-1 to skeletal muscle and improving insulin sensitivity, even on diets high in fat which tend to decrease insulin sensitivity.[30] As well, fish oils may also have important implications for women prone to osteoporosis since they appear to decrease calcium excretion.[31]

Omega-3s also stimulate prostaglandin production. Prostaglandins are chemical messengers that regulate activity in body cells on a moment-to-moment basis and are involved in critical functions like blood pressure regulation, insulin sensitivity, immune system and anti-inflammatory responses. They're also involved in a myriad of other functions, many of which have yet to be fully identified.

If you have a problem producing prostaglandins or experience an imbalance between the different kinds of prostaglandins, overall health can be affected. EFA deficiency can lead to many problems including cardiovascular, hormonal, neurological, musculoskeletal, and immune dysfunction.

What's New in EFA+ version V?

EFA+ has been totally reformulated to contain three times higher levels of DHA and EPA, as well as the addition of other beneficial oils including olive and krill oils. It also contains several new ingredients and higher levels of the vitamins and minerals. **All these changes are intended to increase the health, body composition and performance effects of EFA+.**

To hold all the changes and added ingredients, EFA+ version V now has 180 softgels Instead of 120 softgels per bottle.

Ingredients in EFA+

I formulated EFA+ to be a balanced combination of essential fatty acids (EFAs), and other ingredients that work additively and synergistically to maximize the beneficial effects of EFA+ on health, inflammation and body composition.

For example, the co-factors **zinc,** and **Vitamins C, B3** and **B6** must be present for the benefits of the essential fatty acids to be realized.

Some of the added vitamins and minerals, besides optimizing the use of the essential fatty acids, also have other beneficial properties related to the effects of the essential fatty acids. For example, **vitamins B3 and B6** have significant antioxidant properties and beneficial effects on serum cholesterol and triglycerides. **Zinc** is also heart friendly and has beneficial effects on the immune, cardiovascular and neuromuscular systems. EFA+ also has several other ingredients that help boost the immune system. The combination of ingredients in EFA+ decrease inflammation, and enhance

the immune system so you're more resistant to stress and infections, including bacterial, fungal, and viral infections.[32]

EFA+ also contains several lipotropic factors and other ingredients, including **conjugated linoleic acid, L-carnitine, methionine, serine, choline** and **inositol** that optimize the utilization, transport and metabolism of fat, working to decrease body fat, normalize serum lipids including cholesterol, enhance energy levels, and fight inflammation in the body.

The **antioxidants** present in EFA+ serve several purposes. First, they help preserve the natural state of the EFAs by protecting them from oxidative damage and becoming rancid while in the capsule so that what you get are all the good effects that EFA+ has to offer and none of the bad.

That's one of the reasons why EFA+ combines several antioxidants, including **vitamin A, vitamin C, vitamin E, conjugated linoleic acid (CLA), alpha lipoic acid, astaxanthin** and **glutathione**, with fish oil and other sources of essential fatty acids.[3334]

As well, the association of antioxidants with the omega-3 essential fatty acids, such as the fish oil and other ingredients found in EFA+, act in concert to enhance the beneficial effects of the essential fatty acids on inflammation and on the musculoskeletal, immune and cardiovascular systems.[35,36]
For example, a recent study found that vitamin A has a direct impact on maintaining and increasing blood stem cells and rejuvenating blood production in the elderly. The study also found that vitamin A deficiency impairs the immune system.[37]

Moreover, the antioxidants counteract some of the adverse effects that these essential fatty acids might have. For example, although it's been shown that fish oil increases oxidation of LDL cholesterol, the "bad" cholesterol in the body that's been implicated in cardiovascular disease, it has also been shown that the use of antioxidants counteracts this negative effect of fish oil.[38,39]

Omega-3, 6 and 9 Oils

EFA+ contains omega 3, 6 and 9 fatty acids, including EPA and DHA, the longer chain fatty acids found mostly in fish oil, and oleic acid from olive oil. The plant-based oils are mechanically pressed under low heat, light and oxygen-free environment ensuring the extremely high quality of the formula. As well, pharmaceutical grade fish oil and first press virgin olive oil are used in the formulation. The formula is mercury free, non-GMO, and free of harmful trans fatty acids.

The emphasis in EFA+ is on the omega 3 essential fatty acids and on GLA, an important omega 6 fatty acid, but EFA+ also contains omega 6 linoleic acid as part of flax seed oil and oleic acid, an omega-9 fatty acid, which is also present as a natural constituent of flax seed oil.

Omega 3 and omega 6 fatty acids are precursors for hormones and determine the composition of our cell membranes, influencing the production of pro- and anti-inflammatory substances.[40]

Omega-3 fatty acids, found in fish oils (mainly **EPA** and **DHA**) and flaxseed oil, have many beneficial effects and have been shown to:

- **Reduce oxidant stress[41] and neuroinflammation**[4243] (oxidative stress or free radical damage is a factor of importance in the development of inflammatory events).

- **Increased anabolism and decreased catabolism in skeletal muscle thus increasing skeletal muscle hypertroph**y alone and adding to other ingredients **in improving body composition and improving physical performance**.[444546 47,48]
- **Aid in weight and fat loss**, while helping to maintain or even increase muscle mass especially when combined with CLA (see below).
- **Helps to decrease age-related physical performance decline**.[49]
- Suppress the production of pro-inflammatory compounds in the body and therefore improve the immune system thus decreasing the effects of stress whatever the cause, including improvements in resistance in being affected by all infections including bacteria, fungi, viruses, and other pathogens. EFA+ also beneficial in inflammatory conditions such as **arthritis asthma, metabolic syndrome, diabetes, inflammatory bowel disease, cancer, autoimmune disorders, CVS disease, and aging**.[50,51,5253,54,55,56,57,58,59,60,61,62,63,646566676869]
- Improve serum lipids and provide cardiovascular protection,[70,71,72,,,73,74]
- Provide protection against stress,[75] cognitive aging[76,77,78,79] and depression.[8081]
- May be effective in the prevention of coronary heart disease,[82] and headaches.[83]
- Be positively associated with peak bone density.[84]
- **Reduce the risk for all-cause mortality**.[858687]
- **Protect against the adverse effects of air pollution**, including from pesticides, industrial pollution, motor vehicle exhaust, indoor pollution and cigarette smoke.[888990919293]
- **A combination of alpha lipoic acid and flaxseed oil (both in EFA+ decreases hepatic oxidative stress and lipid accumulation.[94]**

A recent study found that omega-3 fatty acids also play a critical role in preserving the integrity of the blood-brain barrier, which protects the central nervous system from blood-borne bacteria, toxins and other pathogens.[95]

EFA+ also contains extra virgin olive oil which has as its main component oleic acid, an omega-9 fatty acid. Olive oil has been shown to have beneficial analgesic, anti-pyretic, anti-inflammatory, anti-cancer and cardiovascular effects, as well as beneficial effects on cognition and neuropathology.[96979899100]

Besides these important effects of the essential fatty acids, some of the studies above and other recent studies have shown EFA's effectiveness in helping athletes increase training intensity and performance, and have beneficial effects of recovery from exercise.[101102103104105106107]

Conjugated Linoleic Acid

Conjugated Linoleic Acid (CLA) is a mixture of isomers of linoleic acid, which is found preferentially in dairy products, meat, and in cheese, milks and yogurt that have undergone heat treatment.

CLA has a wide range of biological effects. It has potent antioxidant and anti-inflammatory activity, and has shown potential as an anticarcinogen.

Studies in animals and humans indicate that CLA supplementation boosts endogenous testosterone, decreases body fat and increases lean muscle mass. The increase in lean muscle mass is most pronounced in individuals who are exercising regularly.

CLA appears to reduce the ability of fat cells to take up fats from the bloodstream; it also inhibits the formation of new fat cells. CLA also helps cells burn fat at a higher rate, while fueling and preserving muscle, leading to a reduction in fat and an increase in lean muscle mass.

For more detailed info on CLA, see the section on CLA below.

Gamma linolenic acid (GLA) is important for health and has suppressive effects on both acute and chronic inflammation, and effects on decreasing the response to anxiety and stress.[108,109,110,111,112,113114115] It also works synergistically with some of the essential fatty acids to decrease inflammation and stress responses, and along with other essential fatty acids involved in anti-aging.[116,117,118119] GLA has been used to treat various degenerative diseases and a recent study found that it may increase healthspan through its protective effect on DNA.[120]

GLA is needed by the body for the manufacture of certain hormone-like substances called Prostaglandins. These substances have beneficial regulatory effects on the immune system, circulation and the menstrual cycle. Their purpose is to help control and regulate cell growth and to maintain hormonal balance. Also helps to maintain healthy skin.

The use of EPA with GLA (as in EFA+) decreases some of the possible inflammatory effects of using GLA supplements. That's because GLA can be a precursor for arachidonic acid (AA, a "bad" type of prostaglandin that increases platelet aggregation and inflammation) and the addition of EPA reduces AA accumulation in some cells and tissues secondary to GLA supplementation.[121]

Choline, Phosphatidylcholine, Phosphatidylserine, Serine and Policosanol

Choline, phosphatidylcholine, phosphatidylserine, and **serine** are involved in phospholipid metabolism and augment the effects of the EFAs on cell wall structure and integrity, as well as molecular signaling properties.[122] These ingredients are needed for cell membrane integrity and to facilitate the movement of signaling compounds between cells and the movement of fats in and out of cells.[123] They have significant effects on nerve cell membranes, and are required for nerve growth and function.[124]

Policosanols are a blend of compounds isolated from natural plant waxes. **Policosanol** contains several long chain fatty alcohols, including octacosanol, hexacosanol and triacontanol. Animal and in-vitro research have shown that these compounds may support the cardiovascular system and inhibit lipid peroxidation as well as support macrophage activity.

Policosanol helps lower cholesterol levels by slowing the body's own production of cholesterol in the liver, as well as reducing the risk of blood clots and enhancing circulation. Some studies have shown that policosanol, like some EFAs can significantly reduce both total cholesterol and LDL (bad) cholesterol.[125,126,127,128129130]

As well, policosanol, due mainly to the abundant octacosanol, has several other beneficial effects including increasing muscle endurance, recovery after exercise, increasing the efficiency of blood flow, and helping to stabilize cell membranes.[131],[132],[133] Octacosanol may also be useful for improving athletic performance as suggested by some studies.[134],[135136137]

The Secrets of EFAs: How the Omegas Work

Alpha linolenic acid is the principal essential fatty acid in the omega-3 family and linoleic acid takes the lead in the omega-6 series. In a healthy body with sound nutrition, various metabolic conversions take place transferring the raw dietary materials into usable, biologically potent EFAs and other compounds.

Alpha linolenic acid is transformed into eicosapentaenoic acid (EPA) and later into docosahexaenoic acid (DHA). The series three prostaglandins are formed from EPA. As well, EPA reduces the production of the bad prostaglandins from arachidonic acid.

The omega-6 linoleic acid converts to gamma linolenic acid (GLA). Both the EPA and the GLA synthesized from dietary sources undergo another conversion, resulting in hormone-like biochemical compounds know as eicosanoids. These substances aid in virtually everybody activity, from vital organ functioning down to intracellular processes, including helping to regulate inflammation and blood pressure as well as heart, gastrointestinal, and kidney functions.

As such, their use can be preventative and therapeutic for various conditions including some types of cancer, and cardiovascular, neurological and musculoskeletal diseases. Because of their anti-inflammatory and other properties, they are effective anti-aging nutrients. As well, they can be used as an aid for weight loss. for improving body composition and improving both physical and mental exercise and athletic/sports performance.[138139140141]

There are a number of studies showing the mental and physical beneficial effects of the omega-3 fatty acids in the military.[142143144145]

Benefits of EFA+

As far as the essential fatty acids, EFA+ consists largely of the omega 3 family of essential fatty acids, so as to even out the omega 6/omega ratio to one that is closer to the ratio that man has consumed for most of his existence. Bringing the ratio into line enhances cellular function, decreases inflammation, and improves body composition, health and well-being.

EFA+ contains pharmaceutical grade fish oil with higher levels of EPA and DHA. It’s important to include these longer carbon chain omega 3s for two reasons. First, the formation of EPA and DHA from ALA is limited and secondly while fish is one method of getting these oils, most sources recommend that fish consumption be limited to one to three servings weekly (depending on the source of the fish) because so many fish are tainted with mercury, PCBs and other contaminants.

High-quality, purified fish oil, as found in EFA+ are contaminant free and present a viable alternative to frequent consumption of fish.

The Effects of EFA+ on Body Composition and Athletic Performance

There are a variety of supplements that can improve body composition and exercise/sports performance. While EFA+ has a myriad of beneficial effects on health throughout the lifespan, EFA+ has significant effects on improving body composition and athletic performance.

It's been shown that many of us, including athletes, are deficient in EFAs.[146][147][148] As such, it's important not only to correct the deficiency but also to optimize EFA levels.

EFA+ enhances anabolism in skeletal muscle and contributes to the anabolic effects of amino acids and proteins when coupled with exercise. Omega-3 fatty acids, Oleic acid, vitamins A, D and E and zinc (all in EFA+) have all been shown to have beneficial effects on protein synthesis.

EPA and DHA has been shown to enhance muscle protein synthesis in all age groups and in both men and women, under conditions of increased intake of amino acids and the subsequent increase in insulin.[149][150]

A recent paper (published in Feb, 2019) added that besides protein supplementation and resistance training, the omega-3 fatty acids may be useful for the prevention of muscle loss in the elderly through both their anti-inflammatory effects targeting "inflammaging" and through their anabolic effects through activation of the MTOR signaling system (providing significant anabolic effects especially MTORC1) and reduction of insulin resistance.[151]

Moreover, studies have shown that 8 weeks of fish oil-derived omega-3 fatty acid supplementation increased the EPA and DHA content in skeletal muscle phospholipids and enhanced MPS under hyperaminoacidaemic-hyperinsulinaemic conditions in both older and younger adults.[152][153]

Another recent paper has shown that omega-3 fatty acid supplementation helps to prevent muscle protein catabolism in disuse atrophy. It's also likely that supplementing with the omega-3 fatty acids is a factor in decreasing muscle protein breakdown (MPB) and increasing muscle protein synthesis under exercise and post exercise conditions.[154]

EFA+ has additional ingredients that synergistically and additively improve the beneficial effects of the omega-3 fatty acids. Several of the ingredients have significant anabolic, body composition and performance effects.

Antioxidants, such as vitamin E, have also been shown to protect against disuse muscle atrophy.[155] EFA+ contains vitamin E but also contains other antioxidants. For example, EFA+ contains astaxanthin, a powerful lipid-based antioxidant that attenuates muscle atrophy caused by immobilization.[156] Astaxanthin also complements and adds to the many other beneficial effects of EFA+ on body composition, exercise performance and overall health. Astaxanthin is in EFA+ as an ingredient and is also present in krill oil that is also in EFA+.

EFA+ and Dieting

EFAs can be beneficial even if a deficiency doesn't exist and, if used properly, can increase overall health, help you avoid heart disease and lose body fat.[157]

Several studies have shown that fish oil increases insulin sensitivity, the breakdown of body fat and the use of fat as a primary energy source. As such, besides decreasing inflammation and increasing cardiovascular health, they also provide substantial weight and fat loss benefits.

LNA, EPA, and DHA, alone or together, can decrease inflammation in fat cells,[158] enhance lipolysis (body fat breakdown)[159,160] and decrease lipogenesis (body fat formation).[161,162] The combined breakdown of stored body fat and decrease in additional body fat can have very positive results for the dieter. You end up making less and breaking down more body fat when using these oils.

As well, a study found that GLA reduced weight regain in humans following major weight loss, suggesting a role for essential fatty acids in fuel partitioning in humans prone to obesity.[163] So EFA+ can not only help you lose weight and improve body composition, it can also help you keep the weight off.

And EFA+ is even more effective in helping you to get rid of excess body fat when it's used along with my phase shift diets including the Anabolic, Metabolic, Anabolic Solution, and Radical Diets, in which you take in lower amounts of carbs and higher amounts of fats than most diets.

The omega-3s can provide an excellent hedge against worries about cholesterol. For example, marine oils are a big part of the diets of Eskimo tribes. Though their higher-fat diet would seem to make them prime candidates for heart disease and atherosclerosis, they've been found to be almost immune to cardiovascular problems, at least until Western dietary influences in recent years. Studies have centered on omega-3 fatty acids in the fish oils and their cardioprotective capacities as being central to this phenomenon.[164]

Even in cases where dietary cholesterol is increased, omega-3s may aid in lowering serum cholesterol.[165] There is some evidence to suggest that in higher-fat diets aerobic exercise also reduces serum cholesterol[166] and thus may improve the effects of omega-3 rich fish oil on cholesterol.

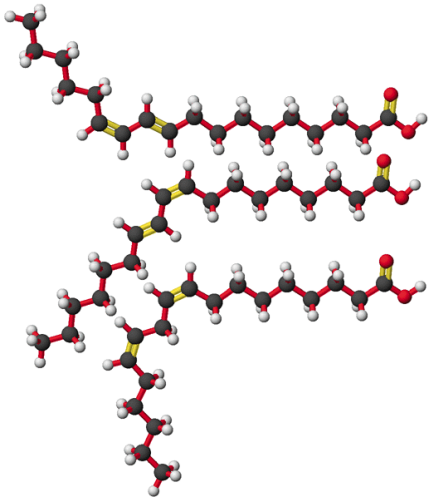
There's no doubt that the omega-3s are a major factor in lowering serum cholesterol levels, preventing coronary heart disease[167,168] and perhaps even preventing or curing atherosclerosis.[169] As well, Blood pressure, clotting, immune response, insulin resistance, and triglyceride levels are all positively affected by the omega-3s in EFA+.[170]

But there's more to the story.

For example, **alpha-lipoic acid** has been shown effective for weight loss and decreasing hip circumference in conjunction with EPA and on its own.[171172173174175176177] As well, alpha lipoic acid has been shown to decrease inflammation and have a beneficial effect on serum lipids and cardiovascular health.[178179180]

Since fat-free mass, and particularly muscle mass, is the main determinant of energy expenditure, the possibility of increasing or even maintaining muscle mass is an important consideration. That's where conjugated linoleic acid (CLA), another key EFA+ ingredient, comes in.

Conjugated Linoleic Acid



Conjugated Linoleic Acid (CLA) is s a mixture of isomers of linoleic acid, which is found preferentially in dairy products, meat, and in cheese, milks and yogurt that have undergone heat treatment. While not an essential fatty acid, CLA has significant biological effects and health benefits.[181182183]

CLA has been shown to have properties above and beyond those of linoleic acid and has a wide range of biological effects.[184] It has shown potential as a powerful anticarcinogen[185186187] and exhibits potent antioxidant and anti-inflammatory activity.[188189190191192193194] Studies have suggested that CLA may be cytotoxic to human cancer cells in vivo.[195]

CLA has been shown to have significant anti-inflammatory properties[196] and to inhibit inflammatory mediators such as PGE2, IL-6, and TNF-alpha,[197],[198] and acts as a COX-2 inhibitor.[199],[200]

Studies in animals and humans indicate that CLA supplementation favorably affects body composition, decreasing body fat and increasing lean muscle mass. The increase in lean muscle mass is most pronounced in individuals who are exercising regularly.

CLA appears to reduce the ability of fat cells to take up fats from the bloodstream; it also inhibits the formation of new fat cells.[201] CLA also helps cells burn fat at a higher rate, while fueling and preserving muscle, leading to a reduction in fat and an increase in lean muscle mass.

Numerous physiological effects in relation to body-weight control have been attributed to CLA in animals. In different animal models, CLA has been shown to reduce body fat and to increase lean body mass.[202,203,204] But CLA has marked effects in humans as well and has been found to decrease body fat mass and support muscle mass in overweight humans. [205,206,207,208]

For example, a study published in the International Journal of Obesity found that those who were given CLA for a four-week period had significant decreases in abdominal fat.[209]

As well, a study concluded that long term CLA supplementation not only helps to decrease body fat but also helps to maintain weight loss in the long term. A long-term study found that a mixture of the two CLA isomers significantly lowered body fat mass in overweight humans at both 1 and 2 years.[210211] It likely does this by affecting various enzymes involved in lipid formation and to a lesser extent enhancing fat breakdown.[212, 213, 214]

As well, CLA seems to have significant effects on weight regain, as it reduces fat uptake into adipocytes by decreasing the formation of fat and but not affecting fat breakdown. It likely does this by affecting various enzymes involved in lipid formation rather than enhancing fat breakdown, known as lipolysis.[215,216,217,218]

Thus, there is an overall increase in fat breakdown since the two processes are usually in dynamic equilibrium with as much fat being produced as is broken down. Decreasing fat formation changes the dynamics to one of overall increased fat breakdown and subsequently a decrease in overall body fat.

Of equal importance, for those wishing to maximize lean body mass, is the possible anti-catabolic effects of CLA.[219,220]

Another study found that CLA reduces body fat mass in specific regions of the body, especially the abdominal area in both men and women, and maintains or increases lean body mass.[221]

Adding to CLA's effects on body composition, one study found that CLA supplementation even increased fat oxidation and energy expenditure during sleep.[222]

The bottom line is that EFA+ has significant effects on weight and fat loss, and increases overall health and wellbeing.

Astaxanthin

Astaxanthin, a powerful lipid-based antioxidant complements and adds to the many beneficial effects of EFA+ on body composition, exercise performance and overall health. Astaxanthin is in EFA+ as an ingredient and is also present in krill oil that is also in EFA+.

Astaxanthin has been shown to have potential to improve physical and mental health, enhance exercise performance, increase fat metabolism during exercise, decrease oxidative stress and muscle injury, delay exhaustion, increasing improve body composition, enhance recovery, prevents redox imbalances, and attenuates muscle damage, counterproductive inflammation and fibrosis induced by rigorous physical training as well as immobilization.[223224225226227228229230231232233234235236237238239240241242]

Some of the benefits of Astaxanthin deserve special attention. For example, astaxanthin has a protective effect on mitochondria, the cellular powerhouses that produce the energy we need to live and function optimally. Protecting the mitochondria is especially important during exercise since destructive free radical production increases almost exponentially and can damage not only the mitochondria, thus impairing energy systems, but also skeletal muscle as a whole impairing performance and recovery and increasing the chance of injury.[243244]

But that's not all because astaxanthin, through its effects on decreasing mitochondrial damage in other parts of the body such as the testes, also increases testosterone production and thus increases the anabolic effects of exercise, and has also been shown to have positive effects on sperm parameters and fertility.[245]

Unlike some other antioxidants, astaxanthin not only has intrinsic antioxidant and anti-inflammatory properties but it also increases the endogenous production of natural antioxidant defense mechanisms such as SOD and heme oxygenase-1.[246]

As well it works synergistically with other ingredients in EFA+. For example, in horses it's been shown that continuous dietary administration of astaxanthin and L-carnitine (acetyl-L-carnitine is in EFA+) attenuates exercise-induced muscle damage.[247] Acetyl-L-carnitine has been shown to have antioxidant properties and beneficial effects on mitochondrial biogenesis,[248]

For all these reasons astaxanthin plays a prominent part in the beneficial effects that EFA+ has on all aspects of health, nutrition, exercise, and anti-aging.

Alpha-Lipoic Acid

Alpha lipoic acid (ALA) has significant biological activity and therapeutic potential secondary to its potent antioxidant and anti-inflammatory properties including its ability to increase levels of intra-cellular glutathione, and to recycle other antioxidants such as vitamin C, vitamin E and glutathione.[249,250,251,252,253,254,255,256,257,258259]

Alpha lipoic acid also has several useful and diverse properties. In a review[260] the author states “LA improves glycemic control, polyneuropathies associated with diabetes mellitus, and effectively mitigates toxicities associated with heavy metal poisoning. As an antioxidant, LA directly terminates free radicals, chelates transition metal ions (e.g. iron and copper), increases cytosolic glutathione and vitamin C levels and prevents toxicities associated with their loss.” ALA and glutathione have been shown to have significant effects in decreasing mercury toxicity in the body.[261]

ALA has significant anti-inflammatory properties and has been shown to inhibit IL-1, a proinflammatory cytokine and inhibit the synthesis of PGE2 by inhibiting COX-2 activity. This latter mode of action simulates the anti-inflammatory effects of the present class of NSAIDS such as Celebrex, Advil, Aleve, etc. As well, the anti-inflammatory effects of ALA are increased since it decreases both the pro-inflammatory cytokines[262263] and secondary cortisol elevations.

ALA was also added to EFA+ because of its actions on decreasing pro-inflammatory cytokines and cortisol levels, its protective effects, and its effects on alleviating pain.[264265266267268269]

It has been shown to inhibit cross-linking among proteins, a process that contributes to the aging process in the body and especially in collagen-heavy tissues such as skin. Alpha-lipoic acid activates a collagen-regulating factor known as AP-1 that turns on enzymes that digest glycation-damaged collagen and thus make the skin more supple and youthful looking.[270]

Besides having potent antioxidant and anti-inflammatory effects, ALA also has significant anabolic effects secondary to its beneficial effects on insulin sensitivity, growth hormone and IGF-I secretion, and energy metabolism, all factors involved in maintaining, repairing and regenerating musculoskeletal tissues.[271,272,273,274,275276]

ALA has also been shown to have significant anti-obesity effects. One study found that ALA decreases hypothalamic AMPK activity and causes profound weight loss in rodents by reducing food intake and enhancing energy expenditure.[277] More recent studies have also found that ALA significantly affects obesity and body composition in humans.[278279] [280281282] A recent study found that the combination of curcumin and alpha lipoic acid exhibit an additive effect in weight and fat loss.[283]

As well, it helps neutralize and remove various toxic metals, including mercury, from the body, both alone and with other compounds such as glutathione (also in EFA+).[284285] A recent study found that ALA reverted the oxidative damage and inflammation in the brain caused by pesticides.[286]

ALA is also useful in reversing mitochondrial dysfunction, especially in the brain and in aging mitochondria.[287,288289290291] A recent study (2019) stated the following on the combined use of ALA and vitamin D3 (both in EFA+)[292] “**In our study, the combination of LA and vitD showed beneficial effects on viability of astrocytes, since the substances are able to cross the brain barrier. In addition, combined LA and vitD attenuated the H2O2-induced apoptosis through the**

mitochondrial-mediated pathway. The combination was also able to counteract the adverse conditions caused by iron, preventing its accumulation. All these data support the hypothesis of the synergistic and cooperative activity exerted by LA and vitD in astrocytes indicating a possible new strategy to slow down ageing.

EFA+ and Mental Health

Reactive oxygen species (ROS) while having important roles in normal brain function, energy production, and signaling pathways, can also be counterproductive when excessive.

overall mild to moderate redox states are normally dealt with by several endogenous antioxidants. However excessive production of Ros results in tissue damage that can detrimental to mental functioning. Excessive exercise and aging are examples of ROS formation that can be ultimately damaging for exercise performance in the former and mental functioning in the latter.

Both result in an exhaustion of the endogenous antioxidant mechanisms resulting in a lack of protection against ROS and subsequent damage to proteins, lipids, and nucleotides leading to dysfunction and impairment in both the short and long term.

While it's generally known that EFAs are good for the cardiovascular and musculoskeletal systems, it's not as well known the EFAs can affect mental health. In fact, a deficiency in EFAs or too little omega 3 fatty acids can lead to decreased mental health, depression and even aggressive tendencies.

Omega-3 fatty acids have been found to have various beneficial effects on the brain that attenuate the decrease in cognition at any age, as well as and the development of dementia with aging, including anti-amyloid, anti-tau and anti-inflammatory actions, and increasing blood flow to the brain.[293294]

EFAs have been shown to assist in treating cognitive decline, depression and other mental health conditions as well as slowing brain atrophy and maintaining the integrity of both white and grey matter of the brain. [295296297,298,299300,301302303304] Low levels of omega-3 EFAs are common in depression.[305306] In one 2002 study, researchers found that treatment with 1 g/d of **EPA** improved outcomes in patients with persistent depression.[307] Another study found that EPA may prove an effective add-on treatment in schizophrenia.[308] There is even some evidence that the decrease in omega 3 consumption may be responsible for increasing homicide rates.[309]

Part of omega-3's effectiveness in treating brain disorders and the reason why lack of omega 3's results in some mental aberrations may be linked to its role in neurotransmission and brain development.[310]

DHA is crucial for proper brain function, and pregnant women are advised to consume adequate levels for fetal brain development.[311312313]

A paper published in 2005 concluded:[314]

> There is no doubt that cerebral lipids, and EFA-derived LC-PUFAs in particular, have significant direct and indirect actions on cerebral function. Not only does the lipid composition of neural membranes affect the function of their embedded proteins, but also many LC-PUFAs are converted to neurally active substances. There is good evidence that psychiatric illness is associated with depletion of EFAs and, crucially, that supplementation can result in clinical amelioration. As well as challenging traditional views of etiology and therapeutics in psychiatry, the clinical trial data may herald a simple, safe and effective adjunct to our standard treatments for many disabling conditions.

A recent paper published in April 2017 found that Neuroprotectin D1 (NPD1), a docosahexaenoic acid (DHA)-derived lipid mediator, protects brain cells and promotes cell survival under uncompensated - a situation of ischemia and/or severe oxidative stress that overwhelms natural endogenous antioxidants and anti-inflammatories.[315] Another paper published in March 2017 found that DHA is beneficial and essential for brain health and diseases.[316]

And a more recent study using single photon emission computed tomography (SPECT), which can determine the blood flow to the brain, found that higher levels of the omega-3 fatty acids, and more specifically EPA and DHA, increased blood flow to the brain, and improved neuropsychological functions including cognition.[317] According to the lead author of the study, this study showed a **"correlation between lower omega-3 fatty acid levels and reduced brain blood flow to regions important for learning, memory, depression and dementia."**

As well, other ingredients in EFA+ enhance the effects of the EFAs on brain function. For example, **choline** is a precursor to the cell-membrane component **phosphatidylcholine** and to the neurotransmitter acetylcholine. Both, plus **phosphatidylserine** and **serine** have been found to enhance certain aspects of cognition and decrease stress.[318,319]

Also, the combination of omega-3 fatty acids, astaxanthin, and krill oil (all 3 present in EFA*) has been shown to have neuroprotective properties.[320]

EFA+ and Inflammation

EFA+ decreases inflammation by providing several potent antioxidants (glutathione, alpha lipoic acid, astaxanthin, zinc, vitamin A, vitamin C, and vitamin E), specific omega 3 and omega 6 fatty acids, and conjugated linoleic acid (CLA).

These ingredients decrease key inflammatory mediators such as proinflammatory cytokines (including TNF-a, IL-6, and IL-1), anti-inflammatory cytokines (including IL-10 and interferon-g), and eicosanoids (prostaglandins, leukotrienes).

For example, CLA has been shown to have significant anti-inflammatory properties and to inhibit inflammatory mediators such as PGE2, IL-6, and TNF-alpha, and acts as a COX-2 inhibitor.[321,322323324325326327328]

Gamma linolenic acid (GLA) is produced in the body from linoleic acid an essential fatty acid of omega-6 series by the enzyme delta-6-desaturase. GLA is further metabolized to dihomogamma linolenic acid (DGLA) which undergoes oxidative metabolism by cyclooxygenases and lipoxygenases to produce anti-inflammatory eicosanoids (prostaglandins of series 1 and leukotrienes of series 3), and thus has significant anti-inflammatory effects.[329]

Linoleic and alpha-linolenic acid have direct effects by altering the cell membrane fatty acid composition (as do choline, phosphatidylcholine and phosphatidylserine – see below) and modulating cell/tissue response to inflammatory events.

Increased intake of GLA, and EPA/DHA, substantially decreases the inflammatory response by several mechanisms. Several studies indicate that GLA, DGLA, EPA and DHA possess anti-inflammatory actions lead to an early resolution of inflammation - attributed to decreased formation of pro-inflammatory eicosanoids and cytokines, and an increase in the production of beneficial eicosanoids such as PGE1, PGI2, PGI3, HPETEs, eNO, LXs, resolvins and NPD1.[330]

The antioxidants in EFA+ also play an important role in decreasing inflammation since it's been shown that reactive oxygen species play a key role in enhancing the inflammatory process.[331]

Alpha lipoic acid also has significant anti-inflammatory properties and has been shown to inhibit IL-1, a proinflammatory cytokine and inhibit the synthesis of PGE2 by inhibiting COX-2 activity.

This latter mode of action, along with similar effects from CLA, simulates the anti-inflammatory effects of the present class of NSAIDS such as Celebrex, Advil, Aleve, etc. As well, EFA+ contains fish oil with substantial amounts of DHA and EPA, which has also been shown to have effects like the anti-inflammatory prescription and OTC drugs.[332]

EFA+: A great way to get EFAs and a lot more.

The bottom line is that EFA+ is a multi-purpose formulation designed to provide the full gamut of all the essential fatty acids and supporting ingredients that are so important in optimizing your metabolism, enhancing weight loss, body composition, and the anabolic and fat burning effects of exercise, boosting your immune system and decreasing counterproductive inflammation and oxidative stress in the body secondary to exercise, aging, pollution, and various diseases.

EFA+, along with MVM, should be used to enhance the effects of any and all my nutritional supplement products including Joint Support, TestoBoost, GHboost, Myosin Protein, Power Drink, Creatine Advantage, LipoFlush, ThermoCell 35, Resolve, Amino, and all the rest.

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