

The Orthomolecular Revolution: New Salvos

With the breakneck speed of research into nature's pharmacy, radical new discoveries seem to appear almost every day.

Developments are occurring so quickly that we only have space in this issue for a brief summary of a few of them. But be warned: this new science is on the razor's edge of research and development. Waiting for official recognition of the value of these dietary substances by government agencies or medical orthodoxy gives many people a reassuring sense of certainty, but it also means a long wait. Over thirty years since Linus Pauling first drew the attention of millions to the protective powers of vitamin C, the US Food and Nutrition Board has just raised its Dietary Reference Intakes (DRIs) -- to a whopping 90 mg daily for men, and 75 mg daily for women. It is up to each of us, as individuals, weigh the evidence, and decide whether we will wait for a paternalistic seal of approval, or embrace new nutraceutical discoveries.

Omega-3 fatty acids are already

famous for their ability to **control inflammation**¹. They do this because of their effects on local cellular "hormones" called **eicosanoids** (eye-KOSS-ah-noids). Some ("bad") eicosanoids promote inflammation, while other ("good") eicosanoids serve a potent anti-inflammatory function. Thus, our health depends in large part on the body's balance of "good" and "bad" eicosanoids. This balance, in turn, depends on two factors: **which EFAs** (omega-3 and **omega-6**) are available as building blocks for making eicosanoids, and **which enzymes** are used to process those EFAs. Like a factory which can make pasta using one of two **raw materials** (either whole wheat or white flour), and shape it into spaghetti, manicotti, or pasta shells depending on **what machinery** is used to process it, the body's eicosanoid factories work with raw materials (EFAs) and processing equipment (enzymes) to make different finished products ("good" and "bad" eicosanoids). By keeping the machinery busy with the right raw materials (the EFA input from your diet and supplements), you can put those factories to work *for* you instead of *against* you, making more "good" and less "bad" eicosanoids, thus preventing inflammation before it starts.

One of the most powerful families of pro-inflammatory eicosanoids are the **leukotrienes**, such as **leukotriene B4 (LTB4)**, which are formed from omega-6 EFAs using the enzyme **5-lypoxygenase (5-LOX)**. The eicosanoids produced by 5-lypoxygenase are the trigger for the pain flareups in **rheumatoid arthritis (RA)**^{2,4}, causing untold suffering to millions. Leukotrienes are also involved in other inflammatory diseases, including **asthma, psoriasis, and ulcerative colitis**⁶. Most omega-3 supplements -- like the **EPA and DHA in salmon oil** -- are unfortunately not very effective in stopping the formation of leukotrienes, because they aren't good at tying up the lipoxygenase enzyme "machine".

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The medical establishment's mainstay for inflammation has for many years been the **nonsteroidal anti-inflammatory drugs (NSAIDs)**, like **aspirin, ibuprofen [Advil®], and naproxen [Anaprox®]**. These drugs do bring short-term relief to many, but at a cost in side effects which may include **gastric ulcers, kidney and liver damage**, and (with a cruel irony) **long-term damage to the joints**. These drugs' pain-relieving and ulcer-inducing powers are *both* due to the fact that they nonselectively block the formation of nearly *all* eicosanoids -- "good" and "bad." Thus, at the same time that they are blocking the formation of the eicosanoids that trigger inflammation, they simultaneously prevent the body from making the eicosanoids which help maintain the lining of the stomach.

These drugs have no direct ability to inhibit 5-LOX, the enzyme responsible for creating LTB4, the flareup-triggering leukotriene. In fact, in some asthmatic patients, **NSAID therapy can actually cause a new form of asthma marked by increased leukotriene production**⁵! The pharmaceutical industry is now racing to make new drugs which inhibit 5-LOX, LTB-4, or the receptors for this master inflammatory messenger. But now a new EFA source stands ready to revolutionize the use of omega-3s against inflammation.

The fatty acid extract of the Australian **green-lipped mussel** (*Perna canaliculus*) provides a rare blend of unique omega-3 fatty acids, most notably the **tongue-twisting octadecatetraenoic acid (OTA)**, which **powerfully and selectively blocks the formation of pro-inflammatory eicosanoids**. This EFA acts like a **laser-guided "smart" missile against inflammation** because of its powerful, *selective* ability to **keep the 5- and 12-lypoxygenase enzyme machinery**

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busy, and thus prevent the formation of leukotriene B-4. Researchers at the Queen Elizabeth Hospital showed that the **fatty acid extract of the mussel powerfully inhibits these enzymes**, preventing the formation of LTB4 and other “bad” eicosanoids. Scientists at Australia’s Queensland University found that, of 37 products tested on animals, **this extract had**

the most powerful anti-inflammatory effects⁷. In fact, as compared to other EFA oils, the fatty acid extract of the **green mussel was 160% as effective as EPA and over three times as effective as evening primrose oil -- using just one percent of the required dose of other EFA oils!** Another green mussel product, which is a crude extract not standardized to the fatty acid content or extracted carefully to protect the crucial omega-3s, had little or no effect on inflammation. And a recent double-blind trial⁸ reported **improvements in 76% of RA patients taking the green mussel lipid extract**, using measures such as **morning stiffness, grip strength, pain scales, and joint functionality.**

And the dangers of the 5- and 12-LOX enzymes don’t stop with arthritis pain. Other **products of the LOX machinery are used by many cancer cells to protect themselves from apoptosis** (the body’s suicide mechanism for damaged or rogue cells)¹¹, to **siphon off healthy cells’ blood supply** (through **angiogenesis**)⁹, and to **spread to other parts of the body (metastasis)**¹⁰. Since it is a potent inhibitor of these enzymes, it is not surprising that **Australian scientists announced that the lipid extract of the green mussel kills cancer cells in test tubes**^{11a}. All this suggests that the extract may yet prove to be powerful nutritional support against this most insidious of diseases.

Phytosterols (plant sterols and

sterolins, as well as **campesterol** and **stigmasterol**) are fatty components of plants which are stripped from the diet by food processing and cooking, and which support human health in many ways. Various combinations of sterols and sterolins have been shown to **improve symptoms of benign prostatic hypertrophy (BPH)**¹², improve some **autoimmune disorders**^{16, 17}, **lower cholesterol** when taken with a meal¹⁸, and to possibly prove helpful in **type II**¹⁹ and **type I**²⁰ **diabetes**. Women who get more phytosterols in their diet are less likely to develop breast cancer²¹, and phytosterols **slow the growth and spread of human breast**¹³, **prostate**¹⁴, and **colon**¹⁵ **cancer cells** in animal and test tube models. They have **anti-inflammatory powers**²³, and are powerful **immune modulators**²¹.

Unfortunately, **most phytosterol products utilize a poor extraction process** which reduces their bioavailability and introduces an unnaturally low ratio of sterolins to sterols. The most readily available such product begins with a sterol extract from one source (pine oil), using an extraction method which almost completely removes the natural sterolins, and then **adds in sterolins separately from soy**. The resulting amalgamation has **one hundred times** as much sterol as the more fragile sterolins, **a ratio much lower than is found in whole foods**: natural sources contain a 10% or better content of sterolins, with some foods providing as much as 80% sterolins by weight²⁴. Such low ratios become even worse upon ingestion, because **the body absorbs two to five times less sterolin than it does sterol**²⁴, so that a 100:1 sterol-to-sterolin mixture may actually provide as unbalanced a ratio as 200:1 or 500:1 in the body -- **ratios far lower than those required for optimal immune enhancement**²¹.

These products are not useless, but they do not live up to the potential of a more

natural phytosterol supplement. **A ratio of one milligram of sitosterols to 5-10 milligrams of plant sterols is optimal**, according to Dr. Karl Pegel of the University of Natal, one foremost authorities on the role of phytosterols in human nutrition. These ratios can be achieved by using a **solvent-free, whole-food plant extraction process** from sprouts. The higher content of sterolins in such extracts may increase the bioavailability of the whole mixture. As well, such extraction methods hold onto many health-promoting phytochemicals and vegetal trace minerals which are lost to more heavily processed products. Whole-food sprout extracts deliver a full spectrum of phytonutrients, in their optimal dosage, form, and ratios - as Nature intended.

Coenzyme Q10 is a powerful fat-soluble antioxidant which **protects membranes from free radicals** and **recycles the vitamin E complex vitamins** (tocopherols and tocotrienols) to their active antioxidant form after they are put out of commission in fighting free radical attackers. More importantly, it is **absolutely necessary to the body’s ability to produce cellular energy in the mitochondria** -- the power plants of every cell in your body. Without CoQ, cells cannot produce the energy they need to perform their functions, be they immune, brain, or muscle cells. CoQ is most well-known for its use in nutritional support for heart disease -- especially **congestive heart failure**. **Thirty-four controlled trials**, as well as a multitude of animal experiments and open trials, attest to its power to rejuvenate the aging heart²⁶.

To get results from CoQ, however, one must not just swallow a pill, but **get the CoQ10 into one’s system and into the mitochondria** where it is needed. Research by Karl Folkers and Peter Langsjoen established early on that a key plasma level of **2.5 micrograms per milliliter** is required to see results in advanced cardiomyopathy^{27, 28}. But achieving this optimal level is harder than you might

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think. Thus, some clinical trials using as much as **200 mg of dry capsule CoQ10 daily have failed to raise levels to this key therapeutic threshold**^{29a}. Another study^{29b} showed how much variation there can be between individuals: subjects were administered **300 mg CoQ daily as dry capsules**, and their plasma levels tested. *On average*, this brought CoQ levels to 2.76 micg/mL, which is in the optimal zone; however, **the plasma levels of individual subjects varied wildly**: while one subject taking this high-dose dry capsule CoQ increased his plasma levels to 5.44 micg/mL, **another subject only achieved plasma levels of 1.38 micg/mL!**

This low absorption is due to way the body must handle fat-soluble nutrients like CoQ. As a fat-soluble compound, CoQ10 cannot pass directly into the blood, but must first be dissolved in some fat. The dissolved CoQ is then absorbed with the fat, using **micelles**, which are tiny absorption “packets” formed from bile. But because of the **high melting point** (48°) and relatively **poor solubility** of CoQ, and because **the digestive system destroys some of the CoQ10** along the way, it is difficult to ensure that much of the CoQ in dry capsules will actually be dissolved, even when taken with a fatty meal. Further, because **individuals vary in bile secretion and intestinal absorption**, even well-dissolved CoQ may not be taken up adequately by many.

The best way around these problems is to **enclose the CoQ10 in tiny microspheres called liposomes**. Liposomes are microscopic membranes composed of two layers of **phospholipids** (like **phosphatidylcholine (PC)** and **phosphatidylserine (PS)**). They are similar to micelles, and also not unlike a simplified version of the membrane of the cell. Because they are soluble in water, liposomes do not require dissolution in fat, bile secretion, or micelle formation; instead, **liposomes pass almost directly**

from the gut, through the intestinal wall, and **into the blood, bringing their CoQ payload with them**. Liposomes also protect much of the CoQ10 from being lost to digestive juices.

Just how effective are liposomes at getting CoQ10 where it has to go? Research performed by Dr. William V. Judy³⁰, veteran CoQ10 researcher^{31,32}, found that in just one month, **90 mg a day of liposomal CoQ10 can raise plasma levels to 2.64 micrograms per milliliter -- levels barely achieved using 600 mg of dry capsule CoQ daily** for eleven days^{29c}, and **not achieved in six months** in some studies using 200 mg^{29a!} The liposomal system not only worked much better than dry capsules, but also **better than 90% of other softgel CoQs**: better than softgels made by simply dissolving CoQ in oil, and even **better than a micronized, hydrosoluble CoQ gel capsule formula**. Clearly, **liposomal CoQ helps ensure that you get the full benefits of CoQ10**.

Although new to Canadian health consumers (it was first introduced to the Canadian market in September of 1998), **Pantethine** has been used in Italy, the United States, and Japan since the 1980s, primarily as a way to safely and effectively support healthy cholesterol balance. **Pantethine is not the same as pantothenic acid** (vitamin B5), but they are related: **Pantethine is the active coenzyme form** of this vitamin. The body doesn't actually use pantothenic acid itself to do *anything*; instead, it must *convert* pantothenic acid into **Pantethine** to unlock its potential. **Pantethine**, in turn, is **the active part of Coenzyme A (CoA)**. CoA is everywhere in the body, and is involved in many vital biological processes, from **energy production and fat metabolism**, to **liver detoxification** and the body's **control of cholesterol synthesis**. It's an exciting molecule which plays a key role in human health.

The trouble is that **the body's ability to make Pantethine from vitamin B5 is very limited**. Each person's genes (and, to

a lesser extent, diet) places a “ceiling” on how much **Pantethine** they will make at any given time. But many people's **internal Pantethine-making machinery runs at far too low a level for optimal health**. The most extensively-researched example of this is in **Pantethine's effects on cholesterol**. No amount of pantothenic acid has significant impact on cholesterol levels, precisely because the amount of **Pantethine** a given person makes from B5 is held under tight genetic control. Thus, some people's **Pantethine** levels are already high enough to keep their blood lipids in healthy balance, and taking more B5 doesn't change this fact; while others don't produce enough **Pantethine** to help support cardiovascular health -- and taking more B5 doesn't change that, either. Fortunately, if you have a **Pantethine-making “deficiency,”** you can **add more Pantethine directly into your system** in the form of a **Pantethine** dietary supplement, thus correcting for an unhealthy low steady state level.

A wealth of clinical evidence^{33-47, 51} shows that **pantethine supplementation supports healthy cholesterol balance**. In adults^{33-46, 51} and children^{40, 47}, in all tested forms of dyslipidemia^{34, 42, 44, 45, 51} (**Pantethine** has not been tested against the rare **Fredrickson's Type I and V** subgroups, which develop pancreatitis rather than cardiovascular disease), in dialysis patients^{35, 41} and diabetics^{34, 35, 38, 45, 46}, as well as survivors of previous heart attacks⁴³, **Pantethine** has proven itself to be a safe and effective modulator of cholesterol levels. The clinical trials have consistently reported that subjects taking **Pantethine** have **lower total cholesterol, LDL, and VLDL**, but **higher HDL**; further, **Pantethine lowers triglycerides**, a lipid risk factor which is coming to the forefront of health concern. Patients in one double-blind, controlled crossover trial⁴⁴ experienced **decreases of 13.5% in total cholesterol and LDL**, while their in **HDL levels rose by 10%**. While taking **Pantethine**, patients also had **decreases of**



13 to 30% in triglycerides, depending on what sort of lipid disorder they had. The other trials have reported similar results.

Pantethine also supports heart health in other ways. It **makes LDL cholesterol less subject to attack by free radicals** mediated by copper⁴⁸. This is important, because we now know that LDL is much more likely to be deposited in the arteries when it becomes oxidized. **Pantethine** also **changes the EFA balance in platelets, increasing their omega-3 content and lowering their omega-6**^{50,51}; this may also be important, because omega-6 EFAs in platelets are more likely to cause **blood clots (thrombi)**, thus triggering a heart attack or stroke, while omega-3s tend to block this tendency⁵².

Science is acquiring knowledge at an accelerating rate: today, our store of basic biomedical knowledge is *doubling* every three-and-a-half years. **Advanced Orthomolecular Research** is committed to keeping you up to date on the newest developments, and of translating new discoveries about natural substances into usable nutraceutical technology.



Processing method affects whey protein quality. **Ion-exchange** extraction, although yielding a high percentage of protein, also reduces the amount of important immune-enhancing peptides (such as **lactoferrin** and **glycomacropeptides**) and the highest-quality protein fraction (**alpha-lactalbumin**). **Ultrafiltered** wheys preserve more of these important components intact. Know what you're buying!

Behold...

the power of the leaf



Each capsule of Natur•Leaf™ contains 300mg of natural plant sterols and sitosterolins, plus 50mg of enzymes. The 300mg sterols/sitosterolin blend comes from *whole plant sprouts*, which have been ground and freeze-dried immediately after harvesting at a hydroponics farm in South Africa. **All the nutrients of the plant sprouts are retained in the end-product**; So, in addition to the sterols and sitosterolins, the capsules contain vitamins, plant source trace minerals, and the *phytochemicals* native to young plant sprouts.

The ratio of the sterols to their glucosides (sitosterolins) in Natur•Leaf™ is about 6:1, derived from a variety of sprouts with natural ratios varying from 10:1 to 4:1. This ratio is important to understand, because it is what is **found in nature**, with no introduction of outside glucosides (sitosterolins) to sterols. Other sterol/sitosterolin products are derived from a chemical extraction process which eliminates or destroys the glucosides, thus requiring an outside glucoside source to be added to the product.



Whole Food Extract *

High dosage strength *

Replace phytosterols lost to food processing *

Optimal Ratio

Organic Cultivation

Broad Spectrum of Sprout Sources

To the best of our knowledge, there is no other phytosterol product on earth which is more concentrated in its sterol/glucoside ratio than Natur • Leaf™, and which offers such a high percentage of bioavailability.

Holistic International is always one step ahead of the competition when it comes to new and innovative products. We were the first to introduce to the Canadian market such products as Pantethine, SAMet and Glucosamine Sulphate. For more information on such ground-breaking products, give us a call and stock your shelves with tried and true quality!

Green Mussel Lipid Extract

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CoQ10

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