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VITAMINS / SUPPLEMENTS

Fish Oil: A Key Component to Positive Clinical Outcomes

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Patients seem to be presenting with more complex problems, and many are responding to care more slowly or have completely unexpected results. Why? The patient of today is much different than that of 10 years ago, much less 50 or 100 years ago, and our clinical approaches need to evolve with this in mind. Understanding the complex physiological interactions which lead to symptoms, and the fact that several essential nutrients are needed at a scale that is yet to be fully appreciated, is an initial step to improving outcomes for patients with complex problems, and those who just don't seem to respond to care.

What if there was a single nutrient which has been shown to support heart health, brain health and development, brain vascular health, neurological health, blood sugar metabolism, eye health, immune health, joint health, and the health of each of your 80 trillion cells?

Omega-3s from fish and fish oils are well-known, but many practitioners don't realize the significance they carry in supporting health. The essential fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are an integral component of each and every cell membrane in the human body and when the balance is shifted towards an increased ratio of the omega-6 fatty acid arachidonic acid (AA), the body shifts to biochemical pathways that are less than desirable. In fact, omega-3 deficiency is such a large problem that in 2011 the Global Summit on Nutrition, Health and Human Behavior stated unanimously, "Brain and heart disorders resulting from LC-Omega-3 (EPA +DHA) deficiency are the biggest challenges to the future of humanity."

Key Biochemical Pathways

For most, biochemistry is dry and uninteresting, but as Michelangelo once said, "the devil is in the details," and the biochemical details are where the magic of fish oils occurs. General understanding of eicosanoid modulation, the endocannabinoid system, and the mesocorticolimbic dopamine system will help with understanding the broad impact EPA and DHA have in supporting human health.

Eicosanoid modulation is the process by which fatty acids are converted to eicosanoids, which affect many body systems, primarily in terms of inflammation and immunity, but also by way of the central nervous system as messengers or signaling molecules. Eicosanoids are hormones released by cells which have local action. The primary classes of eicosanoids are prostaglandin, leukotriene, and thromboxane, which all have very specific actions within the body. The type and potency of the eicosanoids created is highly dependent on the fatty acid ratio within the cell membrane from which the fatty acids are released.

The endocannabinoid system (ECS) is a group of neuromodulatory lipids and their receptors, which

are abundant in the brain, but also found in peripheral tissue. The receptors found in the brain deal with a variety of processes including appetite, sensation of pain, mood, memory, neural plasticity, and metabolism. The endocannabinoids, anandamide and 2-AG, are derived from AA and when too much AA is present in the cell membrane, the associated receptors build up a resistance and do not respond appropriately to signaling mechanisms. This resistance can result in satiety challenges, metabolism changes, and other changes associated with the function of the ECS.

The mesocorticolimbic dopamine system is the combination of the mesolimbic and the mesocortical pathways and is implicated in the regulation of feeding and the manipulation of dopamine levels, which has been shown to affect the reward associated with food.

When the underlying biochemistry is well understood, it will allow the practitioner to provide clinical recommendations with a high level of confidence in both the efficacy and safety of the recommendation.

Clinical Applications

One of the primary challenges of maintaining healthy cell membrane balance of omega-3 fatty acids is the copious amounts of omega-6 fatty acids — primarily AA — which are consumed within the standard American/Western diet. The clinical approach must be two-fold with one portion focused on dietary reduction of AA intake, and the other on increased intake of EPA and DHA through diet and supplementation.

Dietary modification should be the foundation of any plan as it can address concerns around both reduction of AA intake, and increasing EPA and DHA intake. The Mediterranean Diet is a great option to achieve this goal. This well-known diet reduces many of the foods which pack the western diet full of AA. Additionally, the incorporation of cold-water fish is an excellent way to increase the dietary quantity of both EPA and DHA. One common recommendation to acquire adequate levels of EPA and DHA is to use plant-based omega-3 sources of alpha-linolenic acid such as flax or chia. While this will provide omega-3 fatty acids in the diet, it is important to realize that the efficiency of converting alpha-linolenic acid is very poor, with estimates placing the efficiency at about 4–5%. Essentially, intake of 20–25 grams of alpha linolenic acid would yield just 1 gram of EPA, and even less of DHA.

After dietary modification, supplementation with omega-3 fish oil products is the best way to achieve clinically relevant levels of EPA and DHA in the cell membrane. Specifically, a natural, concentrated triglyceride-based formula has been shown to have superior bioavailability to the other available fish oil options, including the ethyl ester form, krill oil, and salmon oil. Recommendations found in the literature vary from 1–7 grams of EPA+DHA daily, but a quick search of the literature using PubMed for fish oil and the specific health concern will provide plentiful condition-specific dosing information. For general health, it is best to just follow the recommendations that the manufacturer makes on the product label.

At times, additional information is necessary to determine dosing needs beyond normal recommendations. When this is necessary, there are a couple of options to aid the decision-making process. One is to have a fatty acid analysis done with a blood plasma sample or a blood spot sample, which is also known as the Holman Omega-3 test. The plasma analysis will provide data on a larger number of tested fatty acids, but those accessed with the blood spot testing are generally enough to aid in dosing determination. With the information gleaned from the results it is straightforward to ascertain the appropriate dosing recommendation to achieve optimal cell membrane fatty acid

balance.

Patients are seeking answers, and results, to help in maintaining optimal health. In order to provide answers, it is important to provide foundational support to help improve day-to-day clinical outcomes. Just a small amount of EPA+DHA can go a long way in helping to maintain health and balance in not only the cell membrane, but the entire body as well.

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