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Prospective Survey

DHA Supplementation for Military

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What are omega-3 fatty acids and specifically what is DHA and why is it receiving attention in the scientific community

Background on fatty acids

Omega-3 fatty acids or n-3 fatty acids (used synonymously) are a family of polyunsaturated fatty acids (PUFA) with a common structural feature: a double bond between the 3rd and 4th carbon counted from the end of the hydrogen omega tail.

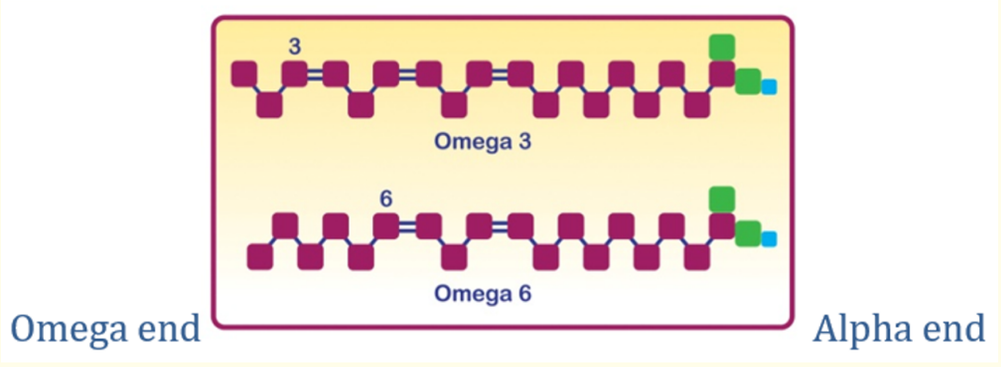

Figure 1

Linoleic acid (LA) and a-linolenic acid (ALA) are fatty acids that the body cannot make in sufficient quantities, so they are required in the diet from food or supplementation. Both of these fatty acids are precursors to longer more bioactive fatty acids such as arachidonic acid (AA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA).

Why DHA and EPA are important

PUFAs are important in numerous cellular functions affecting membrane protein function, membrane fluidity, membrane enzyme activities, and cellular signaling.1 Because of this; PUFAs have been deeply researched and show favorable results in cardiovascular disease, cancer, type 2 diabetes, sport performance, and mental health [1-8]. For the purpose of this paper we will concentrate on mental health; specifically, PTSD and depression.

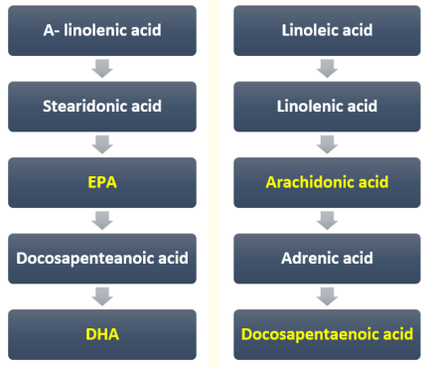

Figure 2

DHA and EPA status is determined by dietary or supplemental intake of omega-3 fatty acids, those being from any of the metabolic precursors of DHA and EPA (see above) or DHA and EPA directly [2]. Studies have shown that short chain omega-3 fatty acids (LA and ALA) alone are not sufficient for proper brain development, and that long chain fatty acids (DHA and EPA) directly need to be consumed [3]. Another note of importance is that omega-3 and omega-6 directly compete for absorption so making sure that one consumes appropriate amounts of both are vital [8].

Changes in PUFA consumption and why it's important

Consumption of omega-3 and omega-6 fatty acids in the American diet has changed significantly since the 1990s [4]. The American diet often does not provide a good balance between DHA, an omega-3 PUFA, and ARA, an omega-6 PUFA. Proportions have gone from approximately a 1:1 ratio of omega-3 to omega-6 in 1990 to as high as a 1:30 ratio since the early 2000s [5]. This change is likely related to the increase in seed oil consumption, particularly soybean oil, that is used in many processed foods [5]. Consumption of these fatty acids directly affects the proportions of the more bioactive forms; DHA, EPA, and AA in tissues, blood, and cells. This is of importance because the relationship of low omega-3 fatty acid status and greater risk of chronic disease appears to be fairly consistent across case control studies, meta-analysis, and observational studies [1-5]. This relationship has been proposed as a risk biomarker for chronic disease [6,7].

What health issues can be positively impacted by the increase in DHA intake among veterans, especially those suffering from PTSD

Background

Post-traumatic stress disorder (PTSD) and depression are very real problems that are afflicting the military; leading to decreased mission readiness, hyper-arousal, suicidal thoughts, and can eventually lead to suicide. When a Veteran has PTSD they are 4 - 5 times more likely to commit suicide than a Veteran without PTSD [9]. As a result of increased numbers of PTSD and depression among military members, Veterans are approximately 50% more likely to commit suicide compared with their civilian counterpart [10]. However, suicide is still a problem for all populations and is the 10th leading cause of death in the United States right under kidney disease [9]. The World Health Organization (WHO) predicts that by 2020, mental illness, including stress-related diseases, will be the second leading cause of disabilities globally [11].

How DHA can help remedy Depression and PTSD

DHA and EPA are fatty acids that are essential for neural function, which affect one's emotional state, cognitive function, and mental health. Collectively, the research is showing potential value for improving psychological and emotional outcomes with dietary and supplemental DHA and EPA [9-13]. This research includes reducing symptoms of PTSD and depression, which, in turn, can help remedy suicidal thoughts, as well as, overall suicide by raising blood levels of DHA and EPA [12]. One meta-analysis showed that higher blood levels of EPA and DHA were associated with decreased risk of depression [13].

Traumatic brain injury is important

Another concern to note that can result in PTSD and depression is traumatic brain injury (TBI). The main causes of TBI for Veterans are from improvised explosive device (IED) or indirect fire (ID), which are very common for military personnel fighting in Afghanistan or Iraq. TBI provokes oxidative damage to plasma membrane phospholipids, which can result in long-term harm in interneuron communication and cognition that can induce PTSD and depression [12,13]. Because of this, studies have been done to preserve these plasma membrane phospholipids, which involved supplementation of DHA and EPA. DHA and EPA have been shown to, "stabilize pathways important for maintaining membrane homeostasis and synaptic plasticity, underlying cognitive abilities" [13]. Thus, they have been shown to reduce signs and symptoms of PTSD and depression, as well as act as a protective mechanism for increasing resilience in the brain for military going into combat [14,15].

What are the current recommendations on the amount of omega-3s and specifically DHA in the diet for all age groups but specifically for the age group(s) who are veterans?

American heart association (AHA) recommendations

Although this paper is concentrating on the effects of DHA and EPA on PTSD and depression, it is important to note that the American Heart Association has recommendations that can be adapted to benefiting PTSD and depression. Although the ideal recommended dosage of DHA and EPA has not been firmly established, evidence suggests that intakes of EPA+DHA ranging from 0.5 to 1.8 grams per day (from diet or supplementation) significantly reduce the number of deaths from heart disease and all causes [16]. These data support the 2000 AHA Dietary Guidelines recommendation to include at least two servings of fish (particularly fatty fish) per week [17]. For ALA, a total intake of 1.5 to 3 grams per day seems beneficial, although definitive data from prospective, randomized clinical trials are still needed.

The American psychiatric association recommendations

Because of the mounting evidence that links cardiovascular disease and depression, the researchers suggested that depressed patients would benefit from omega-3 supplementation for better mood and to prevent heart disease [16-18]. The American Psychiatric Association recommends the use of omega-3 PUFA supplements for all psychiatric patients, primarily for medical benefits [18]. The American Psychiatric Association recommend a dosage of 1g DHA and 1g EPA per day for all patients. Sarris., et al. [19] suggested patients with mental illness increase dietary intake of omega-3 FAs or take a supplement with 1 to 1.5 g/d of mixed EPA and DHA (with a higher ra¬tio of EPA). Additionally, the more severe the depression, the more likely symptoms will respond to omega-3 fatty acids [20]. The generally recognized as safe (GRAS) for DHA has been established at doses less than or equal to 3g/day, thus dosages > 3 g/day should be advised by a physician [21].

Military medicine recommendations

Military medicine stated that, "Given the safety profile, availability, and affordability of n-3 FA, Generally Recognized As Safe amounts of eicosapentaenoic acid and docosahexaenoic acid (up to 3,000 mg daily) should be considered for the athlete and soldier, not only for its general health benefits, but particularly also for those at risk or high exposure to brain impacts". More exciting is that new laboratory research shows the beneficial effects extend to when n-3 FA is given before injury [15]. In 2011 Lewis et al completed a case-control study that compared total serum fatty acid compositions from among 800 randomly selected active duty US military suicide deaths to 800 matched controls. This study concluded that almost all military members involved had low levels of PUFAs, and that the men with a lower DHA status had a 62% increased risk of committing suicide [22].

What would be an ideal DHA supplement for this group

To conclude; the established general health benefits of omega-3 fatty acids, epidemiological evidence for a role in PTSD and depression, modest efficacy data, and low risks make omega-3 fatty acids a reasonable augmentation strategy in alleviating PTSD and depression. While the most beneficial dosage of the omega-3 fatty acids is still being researched, the evidence thus far strongly suggests the inclusion of more omega-3 PUFAs via the daily diet and through supplementation is warranted. Higher doses of these fatty acids may be needed to help Veterans suffering from PTSD or TBI as compared to doses recommended for healthy adults. The ongoing research project, called "Better Resiliency Among Veterans and non-Veterans with Omega-3's" (BRAVO), will be interesting to follow as it will provide excellent science-based determination of the health benefits and at what dosage of omega-3 fatty acids will aid these Veterans [9].

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