

In Touch

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MESSAGE FROM **Mr. HERVE LE FAOU**, CHAIRMAN AND MANAGING DIRECTOR, HEINZ INDIA



In Touch has been providing its readers various articles on varied nutritional topics, particularly concentrating on Micronutrients. This time we are happy to present to you information though brief, about a Macronutrient, which is talked about very seriously, but is still being studied the world over to establish its total relevance. While the role of essential amino-acids is fairly established, the categorical role of essential fatty-acids (EFA) is still on the drawing board. Although omega-3 fatty acids have been known as essential to normal growth and health since the 1930s, awareness of their health benefits has dramatically increased since the 1980s.

About a decade ago, the U.S. Food and Drug Administration gave "qualified health claim" status to EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) omega-3 fatty acids, with a caveat "supportive but not conclusive research shows that consumption of EPA and DHA [omega-3] fatty acids may reduce the risk of coronary heart disease". However, it is accepted that these EFA are important for normal metabolism as mammals including humans have a limited ability to synthesize omega-3 fats, which is an essential long chain fatty-acid when the diet includes the shorter-chain fatty-acids. The 'essential' fatty acids were given their name when researchers found that they are essential to normal growth in young children and animals.

Although fish are a dietary source of omega-3 fatty acids, fish do not synthesize them; they obtain them from the algae (microalgae in particular) or plankton in their diets. So the scientists thought it fit to go to the original source instead of the intermediary and therefore algal omega 3 is a non-fish source, which can brighten the hearts of not only vegetarians, but others as well because the product has a lower level of fish odour on ingestion.

The author, Mr Srikanth, has written an informative article in this issue, for our readers, which is accompanied with a lot of illustrations. We have also included some interesting snippets highlighting the role of omega 3 and omega 6 as essential fatty-acids and their relevance in the modern-day diet.

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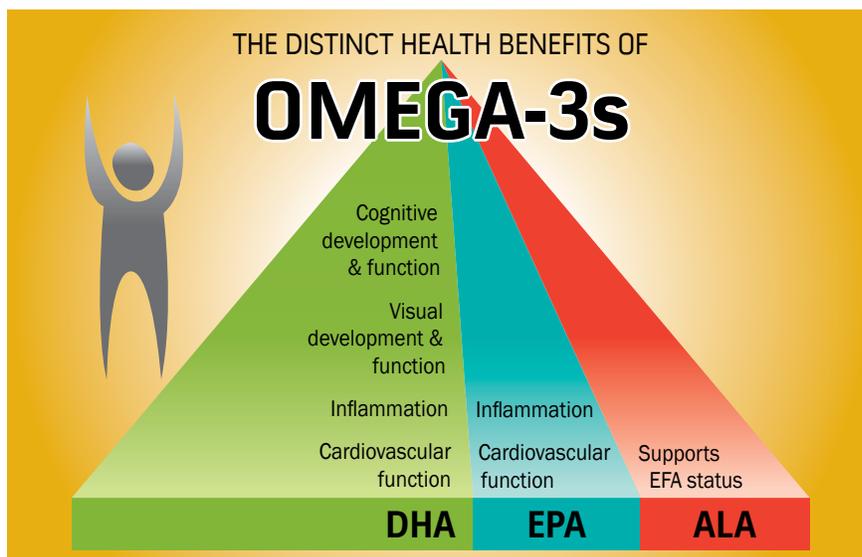
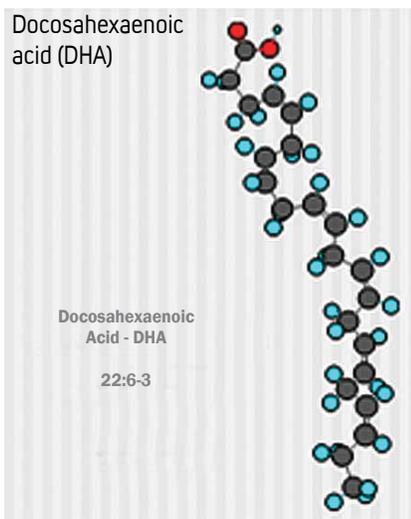
MANAGING EDITOR

DR. P. JAGANNIVAS
 Director, Heinz Nutrition Foundation India, Mumbai

Algal DHA Omega-3 For Brain, Heart and Eye Health



MR. S. N. SRIKANTH



ORIGINS

The story of vegetarian or algal DHA or docosahexaenoic acid, a long chain polyunsaturated Omega-3 fatty acid, began with studying the beneficial use of algae in long-term space flight. In the course of this project, the scientists came to believe that algae represented a virtually untapped resource that could be screened for a variety of applications, to greatly benefit human health. The scientists later set up on their own and developed fermentable strains of microalgae, which produce oils rich in DHA.

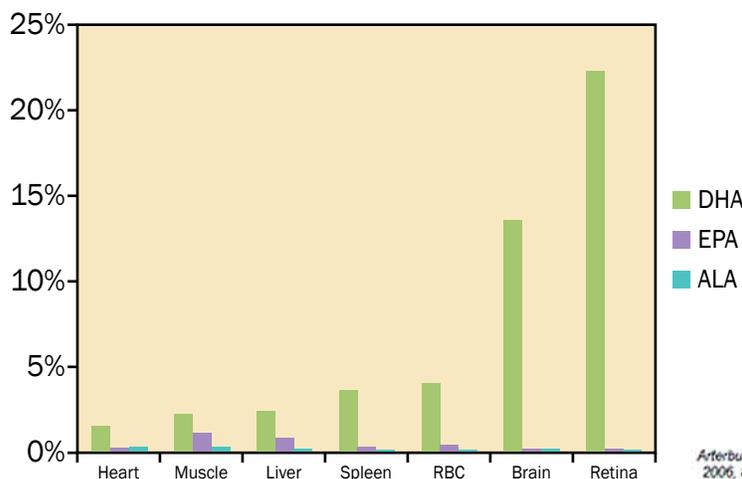
There are several Omega-3 fatty acids. DHA delivers more benefits than others in cognitive improvement, visual function and cardiovascular health. EPA (eicosapentaenoic acid), another Omega-3 fatty acid commonly found in fish oil, reduces the likelihood of heart attacks in

those who are prone to having them.

DHA itself is an important component of all cell membranes and that is

perhaps one reason why it has so many beneficial effects, especially in areas such as the brain and the eye where it is

DHA Readily Accumulates in Critical Body Tissues



Arterburn et al., AJCN 2006, 83:1467S-76S.

concentrated. DHA is also found naturally in breast milk.

DHA FROM ALGAE

For long, fish or fish oil has been the chief dietary source of DHA. Cold-water fish such as salmon, tuna and mackerel are high in DHA. DHA can also be obtained from organic meat and farm chicken. Walnuts and flax seeds contain ALA (alpha-linolenic acid, an omega-3 fatty acid), which supports EFA or essential fatty acid status. ALA is an indirect source of DHA though retro-conversion of ALA into DHA in the human body, but only a small proportion retro-converts. (something is missing in this line)

The fish get their DHA from marine microalgae, which is the original source of DHA. Today, these microalgae are grown in fermenters under controlled conditions. The algae are then harvested and processed to extract the DHA-rich oil. As a result,

algal DHA is 100% vegetarian and free of the ocean-borne contaminants that have caused some concern in fish oil such as mercury, arsenic, various dioxins, PCBs and even DDT. DSM Nutritional Products is the world leader in algal DHA; it offers several variants of both DHA oil and microencapsulated DHA powder.

DHA FOR PREGNANT AND LACTATING WOMEN

Pregnant and nursing women are told to consume a healthy diet that includes essential perinatal nutrients such as folic acid and calcium. DHA too is essential to their diet. It is important for optimal infant brain, eye and nervous system development, during the prenatal and postnatal stages. However, developing fetuses and infants cannot efficiently produce their own DHA and must obtain this vital nutrient through the placenta during pregnancy and from breast milk

after birth. Maternal DHA supplementation during pregnancy and nursing enhances the level of DHA available to the foetus.

Adequate levels of DHA in the maternal diet also help promote a normal pregnancy, babies of higher birth weight and make the mother less prone to post-partum depression.

DHA FOR INFANTS AND TODDLERS

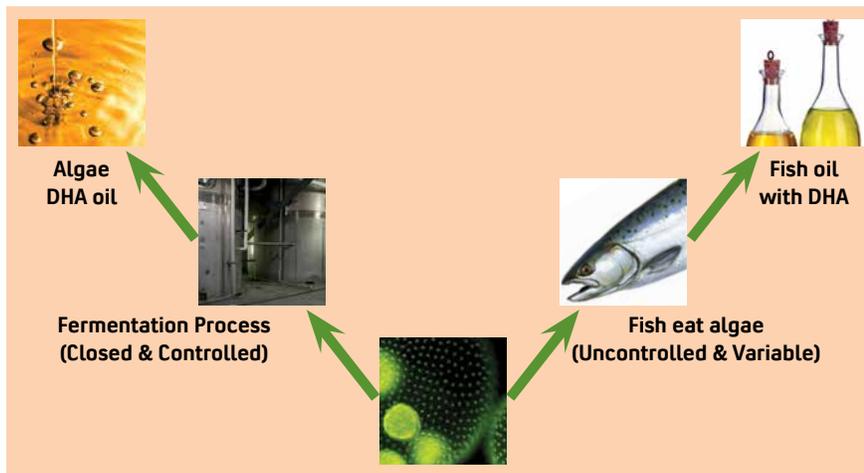
Higher scores on sustained attention in children at 5 yrs of age from mothers who supplemented with DHA

Leiter Test of sustained attention subtest

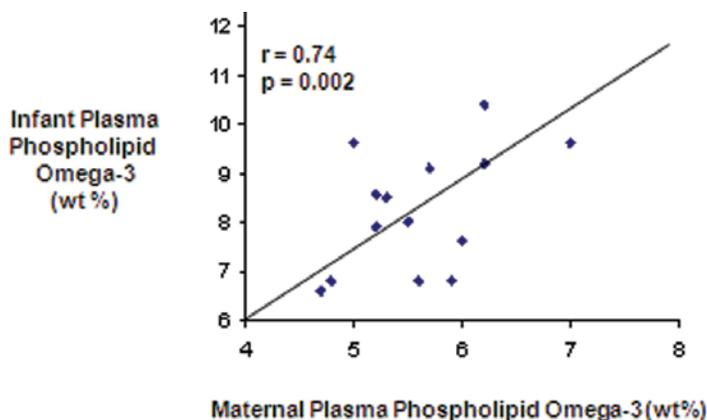


Jensen et al. Pediatric Res, 2004;55A

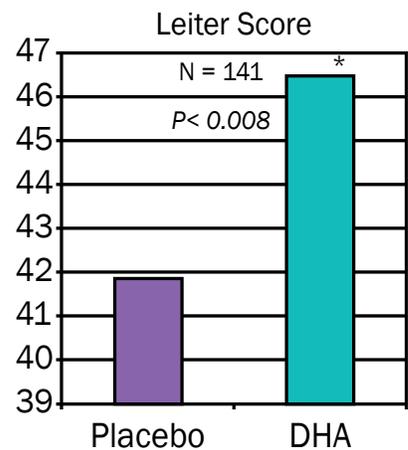
Microalgae: The Original Source of DHA



Maternal Omega-3 status determines infant status



Ali et al. Early Human Develop 120: 24-29-45



Infant formula fortified with DHA and ARA (arachidonic acid) has become a must in much of the developed world and delivers benefits to infants in terms of improved cognition and visual acuity. ARA is an Omega-6 fatty acid, which is also found naturally in breast milk and is produced commercially from a fungal source.

It is important that toddlers and young children consume adequate amounts of DHA in their diet to support rapid brain and eye growth and development. DHA also improves concentration and memory in children and reduces disruptive behaviours.

© KRITCHANUT | DREAMSTIME.COM - OMEGA-3 CAPSULES PHOTO

The Midas Trial

6 month DHA supplementation of subjects (mean age 70+) resulted in

- Fewer errors on CANTAB Paired Associate Learning (PAL) Test
- Shift in normative distribution to a younger age by 3 years
- Decrease in heart rate, highly correlated with week 24 plasma phospholipid DHA levels

ALZHEIMER'S ASSOCIATION PRESS RELEASE

DHA FOR ADULTS AND SENIOR CITIZENS

In the past 25 years, there have been thousands of studies on the positive cardiovascular effects of long-chain omega-3 polyunsaturated fatty acids in general and DHA in particular. DHA helps normalise certain blood lipids by reducing triglycerides and increasing HDL and, in mildly hyperlipidemic men, by lowering blood pressure.

Additionally, DHA, especially concentrated in the region responsible for complex thinking skills, has been associated with a decreased risk of mental decline associated with aging.

DHA improves memory in older adults. The cognitive improvement demonstrated through DHA supplementation has been found to be equivalent to having the learning and memory skills of someone more than three years younger.

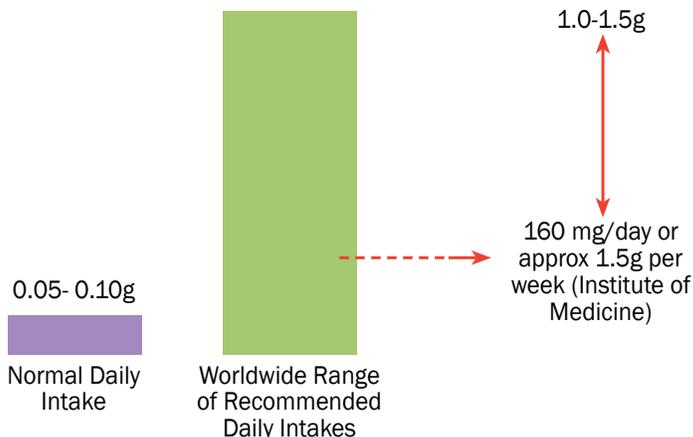
High intake of DHA also decreases the risk of developing age-related macular degeneration, a major cause of blindness.

HOW MUCH DHA DO WE NEED/GET?

DHA Intake of South Indian Women during Pregnancy

1 st trimester	10.2 mg/day
2 nd trimester	11.2 mg/day
3 rd trimester	11.2 mg/day

Recommended Daily Intake of DHA



Different expert bodies have recommended different levels of daily DHA intake for healthy adults, ranging from the Institute of Medicine's 160 mg per day to the 220 mg recommended by ISSFAL, the International Society for Study of Fatty Acids and Lipids, to very high levels, well over 1000 mg per day common in Japan. Pregnant and nursing mothers need at least 300 mg per day.

However, diets in many parts of the world and especially in India contain only a fraction of this requirement. In India, one study found that pregnant women in Bangalore consumed less than 15 mg DHA a day.

THE FUTURE OF ALGAL DHA

DHA is one of the best-researched and best-documented ingredients. Its safety and toxicology have been proved beyond dispute.

Algal DHA fortified foods are available in India. There is also a huge amount of interest in fortifying milk and milk products with algal DHA. Several dairies have carried out successful trials and are awaiting the nod from their marketing departments.

The future of algal DHA in India appears bright indeed.

SNIPPETS

OMEGA-3 FATTY ACIDS MAY PREVENT SOME FORMS OF DEPRESSION

OCTOBER 1, 2014 SCIENCE DAILY



Patients with increased inflammation, including those receiving cytokines for medical treatment, have a greatly increased risk of depression. For example, a 6-month treatment course of interferon-alpha therapy for chronic hepatitis C virus infection causes depression in approximately 30% of patients.

Omega-3 fatty acids, more commonly known as fish oil, have a long list of health benefits, including lowering the risk of heart disease and reducing triglyceride levels. These nutritional compounds are also known to have anti-depressant and anti-inflammatory properties.

Despite some recent negative findings, as their tendency to increase the risk for prostate cancer was proven and some of the putative health benefits were not replicated in large trials, omega-3s remain of high interest to the depression field, where several studies have suggested benefits for depression and other psychiatric disorders.

This led a group of international researchers, led by senior author Dr. Carmine Pariante, to conduct a randomized, double-blind, placebo-controlled study in order to carefully evaluate the effects of omega-3 fatty acids on inflammation-induced depression.

They recruited 152 patients with hepatitis C to participate, each of whom was randomized to receive two weeks of treatment with EPA, DHA, or placebo. EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) are the two

© MASAKAZI | DREAMSTIME.COM - TIRED LADY

main omega-3 fatty acids in fish oil supplements.

Following the two-week treatment, the patients received a 24-week course of interferon-alpha treatment and were evaluated repeatedly for depression.

The researchers found that treatment with EPA, but not DHA or placebo, decreased the incidence of interferon-alpha-induced depression in patients being treated for hepatitis C.

Pariante, a Professor at the Institute of Psychiatry, Psychology & Neuroscience at King's College London, added, "The study shows that even a short course (two weeks) of a nutritional supplement containing one such omega-3 polyunsaturated fatty acid (EPA) reduced the rates of new-onset depression to 10%."

In addition, both EPA and DHA delayed the onset of depression, and both

HIGHER LEVELS OF OMEGA-3 IN DIET ARE ASSOCIATED WITH BETTER SLEEP, STUDY SHOWS

MARCH 6, 2014 SCIENCE DAILY

A randomized placebo-controlled study by the University of Oxford suggests that higher levels of omega-3 DHA, the group of long-chain fatty acids found in algae and seafood, are associated with better sleep. The researchers explored whether 16 weeks of daily 600 mg supplements of algal sources would improve the sleep of 362 children.

The children who took part in the study were not selected for sleep problems, but were all struggling readers at a mainstream primary school. At the outset, the parents filled in a child-sleep questionnaire, which revealed that four in ten of the children in the study suffered from regular sleep

in 362 healthy 7 to 9-year-old UK school children in relation to the levels of omega-3 and omega-6 long-chain polyunsaturated fatty acids (LC-PUFA) found in fingerstick blood samples. Previous research has suggested links between poor sleep and low blood omega-3 LC-PUFA in infants and in children and adults with behavior or learning difficulties. However, this is the first study to investigate possible links between sleep and fatty acid status in healthy children.

At the start of the study, parents and carers were asked to rate their child's sleep habits over a typical week (using a three-point scale). Their responses to the well-validated Child Sleep Habits Questionnaire indicated that 40 per cent of the children had clinical-level sleep problems, such as resistance to bedtime, anxiety about sleep and constant waking in the course of the night.

The study shows that even a short course (two weeks) of a nutritional supplement containing one such omega-3 polyunsaturated fatty acid (EPA) reduced the rates of new-onset depression to 10%.

treatments were well-tolerated, with no serious side effects.

"These new data provide promising support for omega-3 fatty acids to prevent depression, complementing other studies where omega-3s were found to enhance anti-depressant treatment," said Dr. John Krystal, Editor of Biological Psychiatry.

EPA is considered an "endogenous" anti-inflammatory, and in previous work, also published in Biological Psychiatry, these same authors found that subjects with low levels of endogenous EPA in the blood were at higher risk of developing depression. Therefore, the authors speculate that this nutritional intervention restores the natural protective anti-inflammatory capabilities of the body, and thus protects patients from new-onset depression when inflammation occurs.

Although further work is still necessary and the findings must be replicated, these data indicate that omega-3 polyunsaturated fatty acids may be effective in preventing depression in a group of patients at high-risk of depression because of increased inflammation.



© LUSYAYA | DREAMSTIME.COM - CHILD SLEEPING IN BED PHOTO

disturbances. Of the children rated as having poor sleep, the researchers fitted wrist sensors to 43 of them to monitor their movements in bed over five nights. This exploratory pilot study showed that the children on a course of daily supplements of omega-3 had nearly one hour (58 minutes) more sleep and seven fewer waking episodes per night compared with the children taking the corn or soybean placebo.

The findings are due to be published in the Journal of Sleep Research.

The two-phased study looked at sleep

To find clinical level sleep problems in four in ten of this general population sample is a cause for concern. Various substances made within the body from omega-3 and omega-6 fatty acids have long been known to play key roles in the regulation of sleep.

The study finds that higher blood levels of the long-chain omega-3 DHA (the main omega-3 fatty acid found in the brain) are significantly associated with better sleep, including less bedtime resistance, parasomnias and total sleep disturbance. It adds that higher ratios of DHA in relation to the long-chain omega-6 fatty acid AA (arachidonic acid) are also associated with fewer sleep problems.

Lead author Professor Paul Montgomery of Oxford University said: 'To find clinical level sleep problems in four in ten of this general population sample is a cause for concern. Various substances made within the body from omega-3 and omega-6 fatty acids have long been known to play key roles in the regulation of sleep. For example, lower ratios of DHA have been linked with lower levels of melatonin and that would fit with our finding that sleep problems are greater in children with lower levels of DHA in their blood.'

Co-investigator Dr Alex Richardson of Oxford University said: 'Previous studies we have published showed that blood levels of omega-3 DHA in this general population sample of 7-9-year-olds were alarmingly low overall, and this could be directly related to the children's behaviour and learning. Poor sleep could well help to explain some of those associations.'

'Further research is needed given the small number of children involved in the pilot study. Larger studies using objective sleep measures, such as further actigraphy using wrist sensors, are clearly warranted. However, this randomized controlled trial does suggest that children's sleep can be improved by DHA supplements and indicates yet another benefit of higher levels of omega-3 in the diet.'

ALGAL OIL AS A POSSIBLE SOURCE OF OMEGA-3 FATTY ACID DHA TO IMPROVE BLOOD LIPIDS IN PEOPLE WITHOUT HEART DISEASE

Supplementation with the omega-3 fatty acid docosahexaenoic acid (DHA) from algal oil may lower blood triglycerides (TG) and increase both high-density (HDL) and low-density lipoprotein (LDL) cholesterol in people without coronary heart disease (CHD). These are the results of a recent meta-analysis by US researchers from the Cleveland Clinic, Harvard School of Public Health, and Brigham and Women's Hospital.

DHA and EPA (eicosapentaenoic acid) are omega-3 fatty acids found in fatty fish such as salmon, tuna, and mackerel. Both fatty acids are recommended for consumption, but recommendations are higher for those who are pregnant, lactating, or at risk of CHD. Wild fish obtain these omega-3 fatty acids from the marine algae on which they feed. However, these fish population are severely limited due to overfishing and other reasons. Aquaculture (fish farms) has tried to fill the gap and provide an alternative source of fish, but there are environmental concerns surrounding its practice.

Recently, the oils from marine algae have been extracted to develop DHA supplements. However, their effect on CHD risk factors has not been extensively evaluated. Therefore, the authors of this study conducted a meta-analysis of 11 randomized, controlled clinical trials that analysed the associations between algal oil and cardiovascular risk factors such as high blood pressure or high TG.

The studies dated from 1996 to 2011 and there were 485 participants in total. The mean age of the participants was between 24 and 59 years; most studies lasted six weeks. All algal oil supplements used contained no or negligible amounts of EPA. The main study outcome assessed in the meta-analysis was the effect of algal oil supplementation on TG, HDL and LDL cholesterol levels.

The researchers observed a 15% decrease in TG, a 5% increase in HDL cholesterol and an 8% increase in LDL cholesterol in participants supplemented

with algal oil. The action by which DHA is thought to decrease TG levels in turn increases LDL cholesterol levels. The mechanism by which HDL cholesterol is increased by DHA is not known.

Whereas an increase in blood LDL cholesterol may be considered undesirable, it should be noted that DHA can also increase LDL particle size. This is important in that especially small, dense LDL particles are associated with an elevated CHD risk. Increasing the size of LDL particles may therefore partly offset the risk linked to higher LDL cholesterol levels in the blood. To fully assess CHD risk, one needs to consider additional parameters including blood pressure and markers of inflammation. Overall, the effects seen are comparable to what has been observed with fish oil supplements.

The median dose of DHA in the analysis was 1.68 gm per day. This corresponds to a true supplemental dose rather than an amount commonly achieved by diet. For comparison, the adequate dietary intake for adults set by the European Food Safety Authority for EPA and DHA combined is 0.25 g/d. Pregnant and lactating women should get an extra 0.1-0.2 g/day of preformed DHA, and a daily intake of 0.05-0.1 g/day DHA is considered adequate for older infants. Europeans consume about 1-2 servings of fatty fish (such as tuna, salmon, mackerel, herring) per month even though the recommendation is 2-3 servings per week. However, with diminishing fish stocks, alternative sources of EPA and DHA become more and more relevant.

Algae are currently being bred to produce DHA-rich algal oil, which can be used to fortify foods or make supplements. Foods already being fortified include infant formula, olive and canola oils, and soy milk. If someone takes the supplements, they should be monitored by a physician to prevent adverse reactions, especially people with CHD risk factors who may be taking other medications.

As limitations, the authors noted that the number of available studies and participants involved was small. They also called for more independent research to strengthen the evidence base. However, they did find that DHA supplementation from algal oil may reduce TG levels and increase HDL and LDL cholesterol levels in people without CHD. Compared to fish oil, algal oil maybe an equally effective



Compared to fish oil, algal oil maybe an equally effective yet more sustainable source of omega-3 fatty acids. In general, supplements are meant to close nutrient gaps where recommendations are difficult to achieve. Striving for a healthy and balanced diet should remain the primary goal.

yet more sustainable source of omega-3 fatty acids. In general, supplements are meant to close nutrient gaps where recommendations are difficult to achieve. Striving for a healthy and balanced diet should remain the primary goal.

FROM: EUROPEAN FOOD INFORMATION COUNCIL
(WWW.EUFIC.ORG)

J AM DIET ASSOC. 2008 JUL; 108(7):1204-9. (DOI: 10.1016/J.JADA.2008.04.020)

ALGAL-OIL CAPSULES AND COOKED SALMON: NUTRITIONALLY EQUIVALENT SOURCES OF DOCOSAHEXAENOIC ACID

ARTERBURN LM1, OKEN HA, BAILEY HALL E, HAMERSLEY J, KURATKO CN, HOFFMAN JP

Food and nutrition professionals question whether supplement-sourced nutrients appear to be equivalent to those derived from natural food sources. We compared the nutritional availability of docosahexaenoic acid (DHA) from algal-oil capsules to that from assayed cooked salmon in 32 healthy men and women, ages 20 to 65 years, in a randomized, open-label, parallel-group study. In this two-week study comparing 600 mg DHA/day from algal-oil capsules to that from assayed portions of cooked salmon, mean change from baseline in plasma phospholipids and erythrocyte DHA levels was analyzed and DHA levels were compared by Student's t tests. In post-hoc analyses to determine



© CUPERTINO10 | DREAMSTIME.COM - COOKED SALMON PHOTO

DHA levels increased by approximately 80% in plasma phospholipids and by approximately 25% in erythrocytes in both groups. Changes in DHA levels in plasma phospholipids and erythrocytes were similar between groups.

bioequivalence, least-squares mean ratios of per cent change from baseline in plasma phospholipid and erythrocyte DHA levels were compared. DHA levels increased by approximately 80% in plasma phospholipids and by approximately 25% in erythrocytes in both groups. Changes in DHA levels in plasma phospholipids and erythrocytes were similar between groups. As measured by delivery of DHA to both

plasma and erythrocytes, fish and algal-oil capsules were equivalent. Both regimens were generally well-tolerated. These results indicate that algal-oil DHA capsules and cooked salmon appear to be bioequivalent in providing DHA to plasma and red blood cells and, accordingly, that algal-oil DHA capsules represent a safe and convenient source of non-fish-derived DHA.

FROM PUBMED (PMID: 18589030)

PERSONAL VIEW ON THE 'PRESENT PLACE OF DHA IN HEALTH AND DISEASE'

I am strongly of the opinion that one should try to derive the essential nutrients from food rather than supplements. Of course, there are special circumstances that warrant the use of supplements. However, in the case of DHA, I tend to practice a different approach, because I am keenly aware that the deficiency/imbalance of this essential fatty acid is quite rampant. This is why my approach is to first try and modify the diet so as to include the rich sources of DHA, if the diet is short on it. However, if I find that the goal is difficult to achieve, I move on quickly to supplements without wasting much time and effort.

In my practice I notice that it is not always easy to include rich sources of DHA for vegetarians, particularly so for children. Not many parents find it easy to include leafy

vegetables such as mustard, nuts such as walnuts, and seeds such as flax, pumpkin and chia in the diets of their children. Moreover, the vegetarian population gets its quota of DHA only after it is converted from ALA. Unfortunately, the conversion to the active forms of ALA i.e. EPA and DHA occurs only in small amounts, which is why it is common for the vegetarians to fall short on this essential nutrient.

This is the reason I am almost always looking out for signs of possible DHA deficiency in people who seek my advice. In children, I am usually alert if I am told that poor concentration and frequent outbreaks of allergies is an issue. On assessment of the diets of such children, I invariably find that DHA food sources are either limited or imbalanced.

Symptoms such as dry skin and hair or brittle fingernails are also commonly seen in those individuals who are not taking enough of this particular fat. In the elderly population, I find that the commonly encountered problems such as depression or stiff painful joints are alleviated if adequate DHA is provided in the diet or if a supplement is added. I have found that attention to this nutrient has helped bring down raised triglyceride levels in many patients.

For pregnant women and children, I prefer to use the vegetarian-based DHA supplement rather than fish oil, due to the risk of mercury contamination in fish oils.

By Ms. Neelanjana Singh
Nutrition Consultant
Heinz NutriLife Clinic



DR. Y. K. AMDEKAR, M.D., D.C.H.,
HONORARY PROFESSOR OF PAEDIATRICS,
INSTITUTE OF CHILD HEALTH,
GRANT MEDICAL COLLEGE, MUMBAI.

Paradox of ample sunlight and vitamin D deficiency in India

Presumption about adequacy of vitamin D through natural source from sunlight in India has been proved wrong as most of the population avoids exposure to sunlight and those who are exposed still remain vitamin D deficient for variety of reasons. Hence vitamin D deficiency is nearly universal in India in all age groups. However it has different connotations in pregnant women and young children. Vitamin D deficiency results in significant morbidity in pregnant women and also increases risk of tetany in neonates. "In-Touch" presents an excellent review of vitamin D deficiency in pregnancy by Dr Prema Ramachandran. It is important to note that vitamin D deficiency may remain asymptomatic but irrational supplement of vitamin D must be avoided.



The first week of November presented a great opportunity to students and other stakeholders to interact and learn, during the 2nd International Workshop on Micronutrients and Child Health. It was jointly organised by Human Nutrition Unit of All India Institute of Medical Sciences, New Delhi, Indian Academy of Pediatrics (Nutrition Sub-Speciality Chapter) and Sitaram Bharia Institute of Science and Research. Needless to say, it was a well-organised programme, where every scientist was time conscious and maintained a strict discipline to start and finish the presentations on time.

Heinz Micronutrient Campaign (HMC) was one of the sponsors of a plenary session on micronutrients and child health. Dr Anand Pandit made a presentation on food-based intervention to alleviate malnutrition, particularly anemia. HMC had put up a stall where Nurturemate was promoted. We had an overwhelming number of visitors to the stall, who showed keen interest in Nurturemate. Incidentally, Nurturemate is a multi-micronutrient-powder providing fifteen ingredients, including encapsulated Ferrous Fumerate and other haemopoietic factors to be sprinkled over regular cooked food, before eating. Nurturemate is a tasteless and odourless white powder, which does not alter the taste or texture of food. Nurturemate is suitable for large-scale social programmes for alleviating anemia in children below five years. It is a non-profitable and non-commercial product for social marketing promoted by HMC.



- P. Jagannivas,
Managing Editor

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