



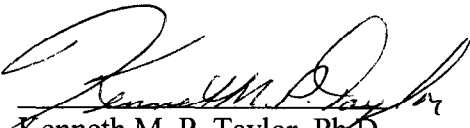
**Memorandum**

0423 '03 JAN 27 P2:19

Date: January 16, 2003  
From: Chemist, Division of Standards and Labeling Regulations, Office of Nutritional Products, Labeling and Dietary Supplements, HFS-821  
Subject: 75-Day Premarket Notification of New Dietary Ingredients  
To: Dockets Management Branch, HFA-305

Subject of the Notification: Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA) [Omega-3 Alaska Deep Sea Fish Oil]  
Firm: YAT CHAU (USA) Inc.  
Date Received by FDA: July 9, 2002  
90-Day Date: October 8, 2002

In accordance with the requirements of section 413(a) of the Federal Food, Drug, and Cosmetic Act, the attached 75-day premarket notification and related correspondence for the aforementioned substance should be placed on public display in docket number 95S-0316 as soon possible since it is past the 90-day date. Thank you for your assistance.

  
Kenneth M. P. Taylor, Ph.D.

Attachments

955-0316

RPT141



SEP 23 2002

Sherman Ye, Ph.D.  
Yat Chau (USA), Inc.  
131-37A 41ST Avenue, 1<sup>ST</sup> Floor  
Flushing, New York 11355

Dear Dr. Ye:

This is in response to your submission of a new dietary ingredient notification, dated July 6, 2002, to the Food and Drug Administration (FDA) pursuant to section 413(a)(2) of the Federal Food, Drug, and Cosmetic Act (the Act) (21 U.S.C. 350b(a)(2)) and Title 21 of the Code of Federal Regulations (21 CFR) Part 190.6. FDA received your notification on July 10, 2002, of your intent to market the product Omega-3 Alaska Deep Sea Fish Oil which contains the ingredients eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). FDA has corrected the names of the ingredients in your submission, which you had identified as eloosapentaenoic acid and docosahoxaenoic acid, respectively.

In accordance with 21 U.S.C. 350b(a), the manufacturer or distributor of a dietary supplement that contains a new dietary ingredient that has not been present in the food supply as an article used for food in a form in which the food has not been chemically altered must submit to FDA, at least 75 days before the dietary ingredient is introduced or delivered for introduction into interstate commerce, information that is the basis on which the manufacturer or distributor has concluded that a dietary supplement containing such new dietary ingredient will reasonably be expected to be safe. FDA reviews this information to determine whether it provides an adequate basis for such a conclusion. Under 21 U.S.C. 350b(a)(2), there must be a history of use or other evidence of safety establishing that the new ingredient, when used under the conditions recommended or suggested in the labeling of the dietary supplement, will reasonably be expected to be safe. If this requirement is not met, the dietary supplement is deemed to be adulterated under 21 U.S.C. 342 (f)(1)(B) because there is inadequate information to provide reasonable assurance that the new dietary ingredient does not present a significant or unreasonable risk of illness or injury.

Your submission indicates that you intend to market the product Omega-3 Alaska Deep Sea Fish Oil as 1000 mg softgel capsules containing 360 mg EPA and 240 mg DHA per serving of 2 softgels with a suggested use for adults of 2 to 4 softgels daily. Your submission also contains information that you believe establishes that the new dietary ingredients, EPA and DHA, when used under the conditions recommended or suggested in the labeling will reasonably be expected to be safe.

Furthermore, your submission provides, among other things, draft labeling and promotional literature you intend to use to market your product. The labeling and promotional literature contain the claims "...reduce blood pressure, aids in the prevention of arthritis, lower cholesterol...and reduce the risk of blood clot formation," "...they are capable of thinning blood and lowering blood...cholesterol levels," and "They have the therapeutic applications for heart disease, inflammatory conditions like arthritis, and psoriasis." These statements suggest that the dietary ingredients that are the subject of your submission are intended for use in the diagnosis, cure, mitigation, treatment, or prevention of diseases. These claims suggest that these dietary ingredients are intended for use as drugs within the meaning of 21 U.S.C. 321(g)(1)(B) and that they are subject to regulation under the drug provisions of the Act. If you intend to make claims of this nature, you should contact FDA's Center for Drug Evaluation and Research, Office of Compliance, HFD-310, 7520 Standish Place, Rockville, Maryland 20855.

Because the information in your submission suggests that your product is subject to regulation as a drug and not as a dietary supplement, we have not reviewed the information in your submission as to whether it provides an adequate basis to conclude that a dietary supplement containing EPA and DHA will be reasonably expected to be safe under 21 U.S.C. 350b(a)(2). Under 21 C.F.R. 190.6(f), a failure by FDA to respond to a notification under section 350b(a)(2) does not constitute a finding by the agency that a new dietary ingredient or the dietary supplement that contains the new dietary ingredient is safe or is not adulterated under 21 U.S.C. 342. Although your product appears to be subject to regulation as a drug, if it were to be marketed as a dietary supplement, and the information contained in your submission is inadequate to provide reasonable assurance that such ingredient does not present a significant or unreasonable risk of illness or injury, the dietary supplement may be deemed to be adulterated under 21 U.S.C. 342(f)(1)(B). Introduction of such a product into interstate commerce is prohibited under 21 U.S.C. 331(a) and (v).

You may submit a new pre-market notification for Omega-3 Alaska Deep Sea Fish Oil under 21 U.S.C. 350b(a)(2) that addresses the issues identified above. A new submission must comply with the requirements in 21 CFR 190.6 and should contain an explanation as to how the information contained in the scientific references and other information you submit provide a basis to conclude that your dietary supplement will reasonably be expected to be safe.

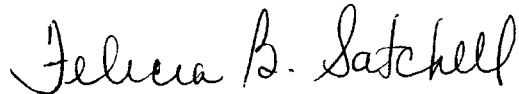
Your notification will be kept confidential for 90 days after the filing date. After October 8, 2002, the notification and related correspondence from FDA will be placed on

Page 3 – Dr. Ye

public display at FDA's Dockets Management Branch in docket number 95S-0316. However, any trade secret or otherwise confidential commercial information that is in the notification will not be disclosed to the public.

If you have any questions concerning this letter, please contact me at (301) 436-2371.

Sincerely yours,

A handwritten signature in cursive script that reads "Felicia B. Satchell".

Felicia B. Satchell

Director

Division of Standards

and Labeling Regulations

Office of Nutritional Products, Labeling

and Dietary Supplements

Center for Food Safety

and Applied Nutrition



一洲美國藥業集團有限公司  
**YAT CHAU (USA) INC.**

131-37A, 41 AVE., 1FL.  
FLUSHING, NEW YORK 11355  
U.S.A.

TEL : 1-800-238-3189 OR 1-800-864-1282  
FAX : 1-888-332-7888 OR 1-718-886-9519  
WEB: www.ycmart.com

July 6, 2002

Division of Standards and Labeling Regulations,  
Office of Nutritional Products, Labeling, and Dietary Supplements (HFS-820)  
Center for Food Safety and Applied Nutrition  
Food and Drug Administration  
5100 Paint Branch Parkway  
College Park, MD, 20740-3835

Re: Notification to the Secretary of Health and Human Services pursuant to Section 8(a)(2) of the Dietary Supplement Health and Education Act of October 25, 1994 (21 USC: Federal food, Drug and Cosmetic Act). Marketing dietary ingredients under Supplement Health and Education Act.

To Whom It May Concern:

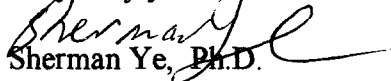
YAT CHAU (USA) INC. is requesting marketing clearance for its dietary supplement OMEGA-3 (ALASKA DEEP SEA FISH OIL). The premarket notification information required by FDA's Office of Special Nutritionals is as follows:

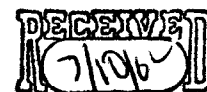
1. Classification name: Omega-3. Common/Usual Name: Alaska Deep Sea Fish Oil
2. Classification: Dietary supplements and their ingredients are governed and regulated under the Dietary Supplement Health and Education Act. Pursuant to Section 8 of the Act such dietary supplements must reasonably be expected to be safe. IN CONSIDERATION OF THE PROVISIONS OF THIS NEW LEGISLATION, YAT CHAU (USA) INC desires to export and market Omega-3 in USA for use as a dietary supplements. This dietary supplement has been in the US food market for many years. It is reasonably expected to be safe. Please see label of product attached hereto as Attachment 1.
3. Label/Labeling/Advertisements: Draft copies of the package labeling and promotional material for the dietary supplement as well as a list of Scientific Publications are enclosed as Attachment 2.

We would appreciate your earliest attention to this submission. It is our understanding that upon the expiration of seventy six (76) days following your office's receipt of this notification and, absent any responsive commentary from your office, YAT CHAU will be able to market the dietary supplement in the United States.

Should you have any questions or comments regarding the enclosed information file, please do not hesitate to contact us.

Very truly yours,

  
Sherman Ye, Ph.D.





# 一洲美國藥業集團有限公司

## YAT CHAU (USA) INC.

131-37A, 41 AVE., 1FL.  
FLUSHING, NEW YORK 11355  
U.S.A.

TEL : 1-800-238-3189 OR 1-800-864-1282  
FAX : 1-888-332-7888 OR 1-718-886-9519  
WEB: www.ycmart.com

Supplement Facts		
Serving Size: 2 Capsules		
Amount Per 2 Softgels		% Daily Value
EPA	360 mg	n/a
DHA	240 mg	n/a
Vitamin E	2.0 I.U.	n/a

Other Ingredients: Gelatin,  
Glycerin.



Yat Chau (USA) Inc.  
Flushing, NY 11355

Lot: 30112014  
Exp.: 7/16/2004

Suggested Use: As a dietary supplement for adults, please take two to four softgels daily with water.

Warning: Keep out of the reach of children

\* This statement has not been evaluated by the FDA. This product is not intended to diagnose, treat, cure or prevent any disease.



Made in U.S.A.



100 Softgel Capsules • 1000mg Each

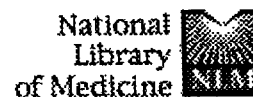


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Fatty acids are the basic building blocks of which fats and oils are composed. Contrary to popular myth, the body does need fat. it must be right kind, however. The fatty acids that are necessary for health and that cannot be made by the body are called essential fatty acids, they must be supplied through the diet. Essential fatty acids have desirable effects on many disorders. They improve the skin and hair, reduce blood pressure, aids in the prevention of arthritis, lower cholesterol and triglyceride levels and reduce the risk of blood clot formation. Elopsapentaenoic acid (EPA) and Docosahoxaenoic acid (DHA) are Omega-3 essential fatty acids primarily found in the oil of cold water fish including Salmon, Bluefish, Herring, Mackerel, Tuna, and the like. Studies indicates that they are capable of thinning blood and lowering blood fat and cholesterol levels. They have the therapeutic applications for heart disease, inflammatory conditions like arthritis, and psoriasis. Taken in excess, DHA can reduce blood clotting capability. It often has vitamin E oil added to prevent rancidity. They come in liquids and capsules.



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Related Resources

- 1: [Stark KD, Mulvad G, Pedersen HS, Park EJ, Dewailly E, Holub BJ.](#) Related Articles  
 Fatty acid compositions of serum phospholipids of postmenopausal women: a comparison between Greenland inuit and Canadians before and after supplementation with fish oil.  
 Nutrition. 2002 Jul;18(7-8):627-30.  
 PMID: 12093443 [PubMed - in process]
- 2: [Allen EE, Bartlett DH.](#) Related Articles, Nucleotide, Protein  
 Structure and regulation of the omega-3 polyunsaturated fatty acid synthase genes from the deep-sea bacterium Photobacterium profundum strain SS9.  
 Microbiology. 2002 Jun;148(Pt 6):1903-13.  
 PMID: 12055309 [PubMed - in process]
- 3: [Horrobin DF, Jenkins K, Bennett CN, Christie WW.](#) Related Articles  
 Eicosapentaenoic acid and arachidonic acid: collaboration and not antagonism is the key to biological understanding.  
 Prostaglandins Leukot Essent Fatty Acids. 2002 Jan;66(1):83-90.  
 PMID: 12051959 [PubMed - in process]
- 4: [Mayer K, Schmidt R, Muhly-Reinholz M, Bogeholz T, Gokorsch S, Grimminger F, Seeger W.](#) Related Articles  
 In vitro mimicry of essential fatty acid deficiency in human endothelial cells by TNFalpha impact of omega-3 versus omega-6 fatty acids.  
 J Lipid Res. 2002 Jun;43(6):944-51.  
 PMID: 12032170 [PubMed - in process]
- 5: [Castro Gonzalez MI, Montano Benavides S, Perez-Gil Romo F.](#) Related Articles  
 [Fatty acids of the tuna of different fishing areas of the Mexican Pacific, canned in oil and water]  
 Arch Latinoam Nutr. 2001 Dec;51(4):407-13 Spanish.  
 PMID: 12012569 [PubMed - indexed for MEDLINE]
- 6: [Castro Gonzalez MI, Montano Benavides S, Perez-Gil Romo F.](#) Related Articles  
 [Fatty acids in sardine canned in tomato sauce from different fishing areas of the Mexican Pacific]  
 Arch Latinoam Nutr. 2001 Dec;51(4):400-6. Spanish.  
 PMID: 12012568 [PubMed - indexed for MEDLINE]



- 7: Kesavulu MM, Kameswararao B, Apparao Ch, Kumar EG, Harinarayan CV. **Related Articles**  
Effect of omega-3 fatty acids on lipid peroxidation and antioxidant enzyme status in type 2 diabetic patients.  
Diabetes Metab. 2002 Feb;28(1):20-6.  
PMID: 11938024 [PubMed - indexed for MEDLINE]
- 8: Pan J, Chung FL. **Related Articles**  
Formation of Cyclic Deoxyguanosine Adducts from omega-3 and omega-6 Polyunsaturated Fatty Acids under Oxidative Conditions.  
Chem Res Toxicol. 2002 Mar;15(3):367-72.  
PMID: 11896684 [PubMed - in process]
- 9: Dichtl W, Ares MP, Jonson AN, Jovinge S, Pachinger O, Giachelli CM, Hamsten A, Eriksson P, Nilsson J. **Related Articles**  
Linoleic acid-stimulated vascular adhesion molecule-1 expression in endothelial cells depends on nuclear factor-kappaB activation.  
Metabolism. 2002 Mar;51(3):327-33.  
PMID: 11887169 [PubMed - indexed for MEDLINE]
- 10: Yli-Jama P, Meyer HE, Ringstad J, Pedersen JJ. **Related Articles**  
Serum free fatty acid pattern and risk of myocardial infarction: a case-control study.  
J Intern Med. 2002 Jan;251(1):19-28.  
PMID: 11851861 [PubMed - indexed for MEDLINE]
- 11: Ergas D, Eilat E, Mendlovic S, Sthoeger ZM. **Related Articles**  
n-3 fatty acids and the immune system in autoimmunity.  
Isr Med Assoc J. 2002 Jan;4(1):34-8. Review.  
PMID: 11802309 [PubMed - indexed for MEDLINE]
- 12: Yam D, Bott-Kanner G, Genin I, Shinitzky M, Klainman E. **Related Articles**  
[The effect of omega-3 fatty acids on risk factors for cardiovascular diseases]  
Harefuah. 2001 Dec;140(12):1156-8, 1230. Hebrew.  
PMID: 11789299 [PubMed - indexed for MEDLINE]
- 13: Valenzuela A, Nieto MS. **Related Articles**  
[Docosahexaenoic acid (DHA) in fetal development and in infant nutrition]  
Rev Med Chil. 2001 Oct;129(10):1203-11. Review. Spanish.  
PMID: 11775350 [PubMed - indexed for MEDLINE]
- 14: Wu FC, Ting YY, Chen HY. **Related Articles**  
Docosahexaenoic acid is superior to eicosapentaenoic acid as the essential fatty acid for growth of grouper, *Epinephelus malabaricus*.  
J Nutr. 2002 Jan;132(1):72-9.  
PMID: 11773511 [PubMed - indexed for MEDLINE]
- 15: Kitessa SM, Gulati SK, Ashes JR, Fleck E, Scott TW, Nichols PD.  
Utilisation of fish oil in ruminants. II. Transfer of fish oil fatty acids into goats' milk.

Anim. Feed Sci. Technol.. 2001 Feb 15;89(3-4):201-208.  
PMID: 11278117 [PubMed - as supplied by publisher]

16: [Rousseau D, Helies-Toussaint C, Raederstorff D, Moreau D, Grynberg A](#) Related Articles

Dietary n-3 polyunsaturated fatty acids affect the development of renovascular hypertension in rats.

Mol Cell Biochem. 2001 Sep;225(1-):109-19.  
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17: [Toriyama-Baba H, Iigo M, Asamoto M, Iwahori Y, Park CB, Han BS, Takasuka N, Kakizoe T, Ishikawa C, Yazawa K, Araki E, Tsuda H](#) Related Articles

Organotropic chemopreventive effects of n-3 unsaturated fatty acids in a rat multi-organ carcinogenesis model.

Jpn J Cancer Res. 2001 Nov;92(11):1175-83.  
PMID: 11714441 [PubMed - indexed for MEDLINE]

18: [Amiano P, Dorronsoro M, de Renobales M, Ruiz de Gordo JC, Irigoien I](#) Related Articles

Very-long-chain omega-3 fatty acids as markers for habitual fish intake in a population consuming mainly lean fish: the EPIC cohort of Gipuzkoa.

European Prospective Investigation into Cancer and Nutrition.  
Eur J Clin Nutr. 2001 Oct;55(10):827-32.  
PMID: 11593343 [PubMed - indexed for MEDLINE]

19: [Kolanowski W, Swiderski F, Lis E, Berger S](#) Related Articles

Enrichment of spreadable fats with polyunsaturated fatty acids omega-3 using fish oil.

Int J Food Sci Nutr. 2001 Nov;52(6):469-76.  
PMID: 11570013 [PubMed - indexed for MEDLINE]

20: [Dewailly E, Blanchet C, Lemieux S, Sauve L, Gingras S, Ayotte P, Holub BJ](#) Related Articles

n-3 Fatty acids and cardiovascular disease risk factors among the Inuit of Nunavik.

Am J Clin Nutr. 2001 Oct;74(4):464-73.  
PMID: 11566644 [PubMed - indexed for MEDLINE]

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## Fatty Acid References / Additional Resources

1. Seidelin, K.N., Myrup, B., and Fischer-Hansen, B. "n-3 Fatty Acids in Adipose Tissue and Coronary Artery Disease are Inversely Correlated". *American Journal of Clinical Nutrition* 55: 1117-9, 1992.
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## Double-Blind Placebo-Controlled Trials

3. Belluzzi, A., C. Brignola, M. Campieri, A. Pera, S. Boschi and M. Miglioli (1996). "Effect of an enteric-coated fish-oil preparation on relapses in Crohn's disease." *N Engl J Med* 334(24): 1557-60.
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# Omega3 News

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published in 1996 and 1997

"Advances in Lipid Methodology-Four"

William W. Christie Editor

Published May 1997: ISBN 0 9514171 7 7

300 pages, Hardcover

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The fourth in an occasional series of books with topical reviews by international experts on aspects of lipid methodology. It should be of interest to academic scientists, from chemistry to medicine, and to those in industry alike.

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Some important references in lipid methodology - 1995 and 1996

Price: \$76 US 45 UK (post free by surface mail, but airmail 6 pounds UK or \$10 US extra outwith Europe.

From - The Oily Press Ltd, 6 Dunnottar Place, West Ferry, Dundee, Scotland DD5 1PJ

Contact: William Christie

E-mail: wchris@sari.sari.ac.uk

"Handbook of Essential Fatty Acid Biology: Biochemistry, Physiology, and Behavioral Neurobiology"

Edited by: Shlomo Yehuda, Bar-Ilan University, Ramat-Gan, Israel and David I. Mostofsky Boston University, Boston, MA.

Published 1997 by Humana Press Totowa, New Jersey, ISBN 0-89603-365-1  
470 pages, hard cover.

## Contents

### Part I: Biochemical Properties

1. Permeability of the Blood-Brain Barrier to Circulating Free Fatty Acids. William A. Banks, Abba J. Kastin, and Stanley I. Rapoport
2. Fatty Acid Metabolism in Brain in Relation to Development, Membrane Structure, and Signaling. M. Thomas Clandinin and Jacqueline Jumpsen
3. Abnormalities in Essential Fatty Acid Status in Alcoholism. Norman Salem, Jr. and Nils Urban Olsson
4. The Biological Properties of Oleic Acid. Elliot M. Berry
5. n-3 Polyunsaturated Fatty Acids and Human Cytokine Synthesis. Gunther Hartmann and Stefan Endres
6. Fatty Acid Regulation of Endocrine Activity. Eric P. Widmaier

### Part II: Physiology and Health

1. w3 and w6 Essential Fatty Acid Status in Human Health and Disease. Ralph T. Holman
2. Visual Function and the Essentiality of  $\alpha$ -Linolenic Acid and Docosahexaenoic Acid in Human Infants. Eileen E. Birch, David Birch, and Ricardo Uauy
3. Neural Function Following Dietary n-3 Fatty Acid Depletion. Andrew J. Sinclair, Harrison S. Weisinger and Algis J. Vingrys
4. Polyunsaturated Fats and Learning: Old Data, New Questions. Donald V. Coscina
5. Fatty Acids, Phospholipids, and Schizophrenia. David F. Horrobin
6. The Seizing Brain: Phospholipolysis, Oxygen Delivery, and Electrical Activity. Francesco Visioli
7. Arachidonic Acid, Neurotrauma, and Neurodegenerative Diseases. Akhlaq A. Farooqui, Thad A. Rosenberger and Lloyd A. Horrocks

### Part III: Learning, Cognition, and Complex Behavior

1. Essential Fatty Acids and Behavior: Is There a Role for the Eicosanoids? Patricia E. Wainwright
2. Oral and Postingestive Controls of Fat Intake. Danielle Greenberg and Gerard P. Smith
3. Physiological Role of Fatty Acids in Infancy: Effect of Dietary Fat on Brain Fatty Acids and Learning Ability in Infancy. Akie Yonekubo
4. Omega-3 Fatty Acid Deficiency and Behavior: A Critical Review and Directions for Future Research. Sydney Reisbick and Martha Neuringer
5. Effects of Essential Fatty Acid Preparation (SR-3) on Brain Lipids, Biochemistry, and Behavioral and Cognitive Functions. Shlomo Yehuda, Sharon Rabinovitz and David I. Mostofsky

Contact: Humana Press  
999 Riverview Drive, Suite 208  
Totowa, New Jersey 07512

Phone: 201-256-1699 Fax: 201-256-8314  
e-mail: humana@mindspring.com

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"Lipids & Nutrition -- Current Hot Topics"

Editor: Mr. K.G. Berger, Consultant, London, UK.  
Published December 1996. ISBN 0-9526542-6-1

**Topics:**

Dietary fat and thrombosis.  
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Based on an SCI Oils & Fats Group symposium held on April 30, 1996.

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"Oils-Fats-Lipids 1995: The Proceedings of the 21st World Congress of the International Society for Fat Research (ISF)"

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Published September 1996. In three volumes. (676 pages, soft cover)

Volumes 1, 2, 3. ISBN 0-9526542-4-5.

Volume 1. ISBN 0-9526542-1-0, Volume 2. ISBN 0-9526542-2-9,

Volume 3. ISBN 0-9526542-3-7.

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# Omega 3 News

## Newsletter

### Volume 1-Jan/Feb/March

Welcome message from Editor

Newsletter Back Issues

### Omega 3 Fatty Acids and Immunity

A Brief History and Update

**Patricia Johnston PhD**  
University of Illinois  
Urbana-Champaign

By 1978, there was sufficient information on the immunological effects of lipids for Meade and Mertin (1978) to write a review. Aspects of this effect had been reviewed earlier by Ferber and Resch (1977). My own interest in the area arose during studies of the effects of essential fatty acid (EFA) deficiency in the rat during development of the nervous system and susceptibility to experimental allergic encephalomyelitis (EAE) a rodent model for multiple sclerosis (MS) (Selivoncheck and Johnston, 1975). It became clear that, at least in part, that the role of dietary EFA as precursors of the eicosanoids may underlie their effects on the immune response. Since I felt that what happens in the brain in EAE first happens in the immune system I diverted my attention to immune effects of dietary EFA. The effect of w3 fatty acids were unclear. Alpha-linolenic acid (18:3w3) was still considered by many as non-essential. This controversy was eventually resolved by the classic publication of Holman et al., (1982) demonstrating 18:3w3 deficiency in a human.

In 1978, a graduate student, Lisa Marshall, who was a passionate believer in the biological role of 18:3w3, entered my research group. There followed a series of papers illustrating that increased dietary 18:3w3 not only changed dramatically the fatty acid composition of immune cells in terms of the w6/w3 ratio but also changed the production of the 2-

### w3 Polyunsaturated Fatty Acids Are Essential!

Our venture to initiate an online newsletter covering developments in omega 3 and omega 6 essential fatty acid studies may be somewhat bold for one who began his career with the advanced technologies of a portable typewriter and a 12" slide-rule (slipstick), and who must now cope with incomprehensible systems such as the internet and Windows. However, as one who grew up in the North Star State learned quite early; to learn to swim one must jump in!

We have made that decision, and this is our first issue of "Omega 3 & 6 News Online". I was encouraged in this direction by a recent experience, which is the major news emanating recently from the Nutritional Biochemistry Section of the Hormel Institute.

A decade ago, we were interested in the study of the fatty acid profiles of normal Minnesotans as the controls in the study of vegetarians (1) and in a variety of studies of both "normal" and diseased groups (2), many of which have not yet been fully published. In general, we found that national "control" groups varied widely, and that Americans suffering from diseases associated with neuropathy or immune deficiency were generally very deficient in total omega 3 essential fatty acids (EFA), as measured in the fatty acids of plasma phospholipids.

We recently learned of the existence of a World Wide Web Journal of Biology, and being interested in the electronic revolution, we submitted one of our manuscripts, which should be of world-wide interest, to that journal. The handling of the manuscript, from submission to publication, including peer review, took

series prostaglandins. Several other graduate students pursued this avenue of research as did other researchers interested in the role of the dietary ratio of w6/w3 in human diseases, particularly those involving uncontrolled inflammatory responses. These earlier studies are covered in reviews (Gurr, 1983; Johnston, 1985, 1988). Collectively, these studies showed that dietary w3 fatty acids modulated the secretion of the inflammatory eicosanoids and cytokines by competitive inhibition of the eicosanoid synthase systems. Eicosapentaenoic (20:5w3) appeared to divert the synthase to less inflammatory products from those produced from arachidonic acid (20:4w6). This, however, was clearly not the whole story particularly when one tried to explain the effects of w3 fatty acids on activities of lymphocytes, cancer incidence, and metastasis (Fritsche and Johnston, 1989, 1990). The third mechanism by which dietary w3 could modulate immune and inflammatory is via alteration in membrane phospholipid fatty acid composition which could alter membrane proteins, receptor function, enzyme activities, and cytokine production. Much recent research has therefore concentrated on altered membrane structure and function when the long chain metabolite of 18:3w3, docosahexaenoic acid, 22:6w3 (DHA), is incorporated into cells of the immune system.

In a brief article it is impossible to do justice to all researchers who are contributing in this area. A few articles which include generous reference lists will, however, provide readers with leads to this burgeoning area of research. Jenki and associates have provided substantial evidence for the role of w3 fatty acid modification of membrane structure and function in the spontaneous release of cytosolic components from tumor cells (Jenski et al., 1991), the alteration of tumor cell sensitivity to immune cytolysis (Pascale et al., 1993); the 22:6w3-induced alteration of Thy-1 and CD8 expression in splenocytes (Jenski et al., 1995), and the role of phospholipid class as a determinant in the effect of 22:6w3's role in tumor cell viability (Zerouga et al., 1996).

Immunity cont....

less than two months. No charges were made, and there is no need for reprints. At the time of submission, the WWWJ8 first issue had been visited about 10,000 times during the first ten months of 1996. Since the second issue, which was published November 1, already there have been an additional 13400 visits by the public.

Our publication (3) raises the question of the adequacy of w3 EFA in one group of Americans, in contrast to several other "normal" populations around the world. Normal adult Minnesotans were found to be at the 20th percentile in the range of "normal" populations we have been able to analyze. A group of American infants was found to be the lowest "normal" group studied. We have found patients with a wide variety of neuropathies and immune-deficiencies to be very significantly deficient in total w3, compared to "normal" Minnesotans. We are currently emphasizing research in this area.

The accompanying **Figure** summarizes our work on "normal" human populations thus far. The total w3 polyunsaturated fatty acids (PUFA) of several populations sampled is plotted versus the total w6 PUFA therein, and these two variables show an inverse relationship, as was demonstrated in this laboratory in animal studies using single competing purified w6 and w3 dietary fatty acids, prior to 1964 (4). High levels of w6 suppress the incorporation of w3 fatty acids into tissue lipids, and high levels of w3 suppress the w6 fatty acids. It appears that in human nutrition, w3 EFA are often in low supply, and that w6 EFA may be overly abundant. There must be an optimum ratio of w3/w6, and this has been found to be 1/4 (0.25) for learning ability of rats (5). In the Figure, the ratios of w3/w6 ranged from a very low 0.09 in American infants, to a very high 0.44 for Nigerians. If learning is best at a ratio of 0.25, it is not surprising that many American children now have difficulty with school.

Fatty Acids Are Essential continued.....



This page will contain the current newsletter as well as back issues. The newsletter will contain 2 articles per each issue and address research areas pertaining to polyunsaturated fatty acid research.

If you are interested in publishing an article or would like to see a particular area or issue addressed by the newsletter please contact the editors at:  
[editor@omega3news.co.net](mailto:editor@omega3news.co.net)

**Hard copies of the newsletter will also be available. To receive a hard copy of the newsletter contact Doug Bibus by email or call at 507-433-8804.**

# Omega3 News

## Links to other Fatty Places

This page will list links to other sites relevant to polyunsaturated fatty acids. Academia, personal homepages, industry, resources will all be listed here. If you would like your link or list of links to appear here please contact the editor at [editor@omega3news.co.net](mailto:editor@omega3news.co.net)

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### Organizations:

#### American College of Sports Medicine

Learn about ACSM's mission to promote health and fitness, research and information. Get in shape on fitness and health related issues and topics.

#### American Dietetic Association (ADA)

Check out ADA online for nutritional news and information! Catch the 'tip of the day' for good nutrition. Find other great nutritional information under "Nutrition Resources", including a "good nutrition reading list" for children, parents, consumers, athletes and diabetics.

#### American Oil Chemists' Society (AOCS)

Its all here folks. AOCS at its best, including information about meetings, books and publications. Check out the latest Lipids, JAOCS and INFORM titles and abstracts. Find out how to become a member or get you or your laboratory certified by AOCS.

#### American Society of Clinical nutrition

Learn about ASCN. Find key nutritional information including ASCN press releases, "House Testimony" and job opportunities.

#### American Society for Clinical Nutrition

Discover ASNS (AIN). Find out about awards, ASNS position statements and check out current and past titles and abstracts for the Journal of Nutrition.

#### American Society for Nutritional Sciences (American Institute of Nutrition)

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#### American Society for Nutritional Sciences

#### American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.)

#### BASF Human Nutrition

BASF Human Nutrition supplies microencapsulated dry n-3 (trademark) omega-3 fatty acids in various ratios of EPA and DHA.

#### Essential Nutrient Research Corporation (ENRECO)

Ever wonder what flax is or why it is so good for you? ENRECO's homepage contains a bunch of information about flax and staying fit. Check out the huge flax publications data base that details hundreds of papers about flax, omega 3 and

related research.

**Federation of American Societies for Experimental Biology (FASEB)**  
**Institute of Food Technologists**

**International Union of Nutritional Sciences**

**National Institutes of Health (NIH)**

**The University of Minnesota Department of Food Science and Nutrition**

**The US Department of Agriculture Food and Consumer Service**

**The US Department of Health and Human Services**

**Journals:**

**American Journal of Clinical Nutrition (AJCN)**

**MedWeb: Electronic Newsletters and Journals**

**Publishers' Catalogs Home Page**

**Resources for Science and Technical Writers**

**The World-Wide Web Virtual Library: Electronic Journals**

**Interest Sites:**

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**The Arizona Dietetic Project**  
**Cyberounds**

**Dietitian On-Line**

**Keystone Meetings**

**Lipid Pathways**

**Oilseeds Home Page**

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**Stephen B. Edelson, M.D., F.A.A.F.P., F.A.A.E.M**

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Up

## Essential Fatty Acids: The Healing Fats

To avoid the killer fats that we hear so much about, many people have turned to low fat diets, decreasing their intake of the healing fats required for life.

Low fat diets, useful for atherosclerosis, can kill you over the long term. Children are especially vulnerable to damage from low fat diets. To balance the one-sided view on fats, we must talk about essential fatty acids (EFAs).

### Essentiality of EFAs

Like vitamins, EFAs are essential to health. Older literature, in fact, refers to them as vitamin F. Vitamins and EFAs are essential because:

- We must have them to live and to be healthy.
- Our bodies cannot make them from other substances.
- We must obtain an adequate supply from external sources from food or from supplements.
- Deficiency results in gradual deterioration of cells and tissues, and ultimately, in death.
- Increasing the intake to adequate levels reverses the signs brought about by deficiency.

This definition of essentiality reflects the fact that essential nutrients perform key functions in our cells and tissues that the body cannot live without. EFAs play their essential roles by:

- Helping to form the membrane barrier that surrounds our cells and intracellular factories (organelles).
- Determining fluidity and chemical reactivity of membranes.
- Increasing oxidation rate, metabolic rate, and energy levels.
- Serving as starting material for hormone-like regulating molecules (prostaglandins) that govern cell activities on a moment-to-moment basis.

### Special Properties Of EFAs

While EFAs are like vitamins in their essentiality, they differ in other respects. Vitamins are required in small amounts (mg/day). EFAs are macronutrients, necessary in grams/day.

A second difference is that EFAs are perishable, deteriorating rapidly when

exposed to light, air, heat and metals. Unlike vitamins, EFAs cannot be dried, powdered, and stored for several years. EFA sensitivity makes careful processing and freshness extremely important.

#### Omega 6 And Omega 3 EFAs

Many lay references and college texts on nutrition suggest three EFAs: linoleic, linolenic, and arachidonic acids. This outdated information is wrong. Two fatty acids are essential to human health. (Fish require only one fatty acid and plants require neither—they make EFAs.)

The first is the omega 6 EFA, which is called linoleic acid (LA). LA is abundant in polyunsaturated safflower, sunflower, and corn oils. The second, known as the omega 3 EFA, is called alpha-linolenic acid (LNA). Sometimes referred to as super-unsaturated, LNA is found abundantly in flax and hemp seeds.

LA and its derivatives belong to the omega 6 family of polyunsaturates. In addition to linoleic acid (LA), this family includes gamma-linoleic acid (GLA), dihomogamma-linolenic acid (DGLA), and arachidonic acid (AA).

If LA is provided by foods, our cells make GLA, DGLA, and AA. Bad fats (margarines, shortenings, trans-fatty acids, hard fats, sugar and cholesterol), lack of minerals (magnesium, selenium, zinc) and vitamins (B3, B6, C, E), viruses, obesity, diabetes, aging, and rare genetic mutations can all inhibit omega 6 conversion. In such situations, an oil containing omega 6 derivatives can help. GLA is present in evening primrose, borage, and black currant seed. DGLA is found in mother's milk. AA is found in meats, eggs, and dairy products.

LNA and its derivatives belong to an omega 3 family of superunsaturates. Besides alpha-linolenic acid (LNA), this family includes stearidonic acid (SDA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). If LNA is provided by foods, our cells make SDA, EPA and DHA. When the conversion of EFAs to their derivatives is inhibited by the factors listed above, DHA from black currant seed oil, or EPA and DHA from fish oils and northern ocean algae can be given.

#### Properties Of EFAs

The value of LA and LNA to health results from their chemical properties. EFAs react with oxygen (EFA-rich oils like flax, hemp, safflower were traditionally used in paints because they oxidize, dry and harden quickly when exposed to air). When fresh, these oils are valuable human foods. EFAs absorb sunlight, increasing their ability to react with oxygen by about 1000-fold and making them very active chemically.

EFA molecules carry slight negative charges that cause them to repel one another. They spread out in all directions. This property enables EFAs to carry oil-soluble toxins from deep within the body to the skin surface for eliminations. EFAs form associations with sulfhydryl group (cysteine) in proteins, important in reactions that make possible the one-way movement of electrons and energy on which life depends. EFAs store electric charges that produce bio-electric currents important for nerve, muscle, and cell membrane functions, and the transmission of messages.

#### EFA Functions

As structural components of membranes, EFAs help form a barrier that keeps foreign molecules, viruses, yeasts, fungi, and bacteria outside of cells, and

keeps the cell membrane proteins, enzymes, genetic material, and organelles (small organs) inside. They also help regulate the traffic of substances in and out of our cells via protein channels, pumps, and other mechanisms.

They perform similar functions in membranes that surround organelles within our cells. EFAs fulfill many functions:

- Regulate oxygen use, electron transport, and energy production in our cells?most important moment-to-moment processes.
- Help form red blood pigment (hemoglobin) from simpler substances.
- Keep juice-producing (exocrine) and hormone-producing (endocrine) glands active.
- Help make joint lubricants.
- Are precursors of prostaglandins (PGs), three families of short lived, hormone-like substances that regulate blood pressure, platelet stickiness, and kidney function. A delicate balance between PGs with opposing functions, in part determined by omega 6 and omega 3 intake, determines the health of our cardiovascular system.
- Help transport cholesterol.
- Help generate electrical currents that make our heart beat in orderly sequence.
- Are precursors of derivatives like DHA, which are needed by the most active tissues?brain, retina, adrenal, and testes.
- Help our immune system fight infections by enhancing peroxide production.
- Help prevent the development of allergies.

EFAs play a role in every life process in our body. Life without them is impossible. When foods are EFA-poor, expect a diversity of health problems.

#### EFA Requirements

Of approximately fifty known essential nutrients, LA has the highest daily requirement. The amount needed varies with season, latitude, levels of activity and stress, nutritional state, and individual differences.

One to two percent of calories (1 tsp., 3 to 6 grams/day) prevent signs of deficiency in most healthy adults. LA optimums are around 3 to 6 percent of calories (1 tbsp., 9 to 18 grams/day), requiring about 30 IU of vitamin E. Obese people and those eating hard fats, sugar, and trans-fatty acids require more.

Nutrients essential for LA functions include magnesium, selenium, zinc, and vitamins A, carotene, B3, B6, C and E.

An adult carries about 10- kilograms of body fat. About 1 kilogram (2.2 lbs.) is LA. Vegetarians?bodies carry up to 25 percent of their body fat as LA. People with degenerative disease average only about 8 percent of their body fat as LA.

Alpha-linolenic acid (LNA) optimums range between 2 and 9 grams (1 or 2 tsp.) per day, averaging 2 percent of daily calories. Body content in healthy people is around 2 percent of fat, or 200 grams (half a pound) of LNA. LNA requires the same antioxidants, minerals, and vitamins necessary for LA functions.

#### Omega 6 To Omega 3 Ratio

Omega 3 to omega 6 ratios in healthy populations range from 1:2.5 (Inuit diets) to 6:1 (other traditional diets). Since 1850, omega 3 consumption has decreased to one-sixth its traditional level, resulting in an omega 6 to omega 3 ratio of 20:1 (contemporary polyunsaturated oil diets), associated with degenerative conditions.

Flax, our richest source of omega 3, quickly replenishes a long-standing omega 3 deficiency. A dozen 8 oz. bottles of good quality flax oil consumed over the course of a few months will suffice.

Long-term exclusion or excessive use of flax oil can result in omega 6 deficiency after about two years, because flax oil is omega 3 rich but omega 6 poor.

If a person has cancer, inflammatory conditions, or needs to lose weight, omega 3 should be favored. Otherwise, an omega 6 to omega 3 ratio between 1:2 and 1:3 is suitable.

#### Processing EFAs

In nature's package, EFA-rich oils keep for years without spoiling. Out of that package, light, air, and heat attack EFAs. Like perishable produce, EFA-rich oils should be made with care and obtained fresh.

Frying and deep frying destroy EFAs by the combined effects of light, oxygen, and heat, producing toxic substances that produce atherosclerosis and cancer.

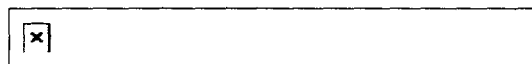
EFA-rich oils should be made and packaged in the absence of light, oxygen, and heat. Frozen solid (which does not damage them), oils remain unspoiled for a long time. Manufacturers should ship them directly to retailers or consumers without stops along the way.

#### Summary

Healing fats, those containing unspoiled EFAs, are vital to health. Both EFAs must be obtained from foods in an appropriate ratio. Hard, hydrogenated, and overheated (killer) fats interfere with vital EFA functions.

To unfold their health benefits, EFAs must be fresh, protected from destruction by light, oxygen, and heat, and accompanied by the minerals and vitamins required for their metabolism in the body. Overheating, refining, and hydrogenation destroys EFAs and their value to human health.

An adequate supply of healing fats is even more important to health than the avoidance of killer fats.



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NOTICE: This Information is provided for educational purposes. Any medical procedures, dietary changes, or nutritional supplements discussed herein should only be undertaken on the advice of a qualified physician.

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