Fish Oils and Pregnancy and Infants

Summaries of the latest research concerning fish oils and pregnancy and infants

Fish consumption and pregnancy outcome

COPENHAGEN, DENMARK. Danish researchers report that women who consume fish or seafood once a week during the first 16 weeks of pregnancy have a 3.6 times lower risk of giving birth to a low birth weight (less than 2500 grams) or premature (born before 259 days) baby than do women who never consume fish or seafood. The study involved almost 9000 women who completed a food frequency questionnaire. The researchers found that women whose daily intake of fish was less than 15 grams, corresponding to a fish oil intake of 150 mg/day, were significantly more likely to give birth to a preterm or underweight baby than were women with higher intakes. They suggest that small amounts of fish oil may confer protection against preterm delivery and low birth weight. *Olsen, Sjurour Frooi and Secher, Niels Jorgen. Low consumption of seafood in early pregnancy as a risk factor for preterm delivery: prospective cohort study. British Medical Journal, Vol. 324, February 23, 2002, pp. 1-5/*

Maternal milk and DHA supplementation

MUNICH, GERMANY. Docosahexaenoic acid (DHA) is vital for the proper development of an infant's brain and retina. DHA must be supplied through mother's milk or infant formula as the infant itself is unable to synthesize it from other dietary sources such as flax oil. The DHA content of human milk varies from 0.05% in vegetarian women to 1.40% in Inuit women. An average level in omnivorous women is about 0.3% by weight. It is assumed that a mother's diet affects the composition of her breast milk, but no specific studies of the transfer of DHA to breast milk has been made so far. Researchers at the Ludwig-Maximilian-Universitat now report that an increased dietary intake of DHA by a lactating woman results in a proportional increase in her breast milk. Their study involved 10 lactating women who between week 4 and 6 postpartum supplemented with either 200 mg of DHA per day or 200 mg of a corn/soy oil mixture (placebo oil). At the end of the 2 weeks the DHA content of the milk from the DHA-supplemented mothers had increased by 28% while the DHA content in the milk from the mothers in the placebo group had decreased by 25%. In other words, after 2 weeks the DHA content in the milk from DHA-supplemented mothers was almost twice as high as in the milk from the mothers in the placebo group. There were no significant differences in the amount of milk produced per day by the 2 groups. Editor's note: Supplementation with DHA would be particularly important for lactating mothers who are vegetarian. *Fidler, Natasa, et al. Docosahexaenoic acid transfer into human milk after dietary supplementation: a randomized clinical trial. Journal of Lipid Research, Vol. 41, September 2000, pp. 1376-83/*

Fish oil supplementation during pregnancy is safe

ADELAIDE, AUSTRALIA. There is still considerable controversy regarding the role of long chain omega- 3 polyunsaturated fatty acids (PUFAs) in infant development and little attention has been paid to the requirements of mothers for these nutrients. Two researchers at the University of Adelaide have just released a review of existing research findings concerning these subjects. One clinical trial found that women who supplemented with fish oil (1.5 grams eicosapentaenoic acid [EPA] and 1 gram docosahexaenoic acid [DHA] daily) from their 30th week of pregnancy extended the pregnancy by 4 days and gave birth to infants weighing an average of 100 grams more that infants born to mothers supplementing with placebos (olive oil). Other studies have failed to confirm these effects. A recent study found that DHA levels decrease rapidly in women

after giving birth independent of whether they are breastfeeding or not. There is speculation that this relative DHA deficiency could be a major factor in postpartum depression, but clinical trials are needed to confirm this. The deficiency can be completely eliminated by supplementing with 200 to 400 mg/day of DHA. The evidence concerning the benefits of maternal DHA supplementation on infant development is inconclusive. One study found that infants with an adequate DHA status at 3 months of age scored better on a mental development test at age 1 year, but not at 2 years of age. The researchers conclude that there is no evidence that maternal DHA supplementation is harmful and that it may have subtle benefits to both mother and infant. However, further clinical trials are needed to verify this. *Makrides, Maria and Gibson, Robert A. Long-chain polyunsaturated fatty acid requirements during pregnancy and lactation. American Journal of Clinical Nutrition, Vol. 71 (suppl), 2000, pp. 307S- 11S/*

Formula-fed infants need DHA

TORONTO, CANADA. A team of researchers from Canada, Britain, and the USA emphasize the importance of ensuring that newborn infants get sufficient docosahexaenoic acid (DHA) in order to ensure optimal neural and visual development during the first 6 months of life. They point out that there is still controversy as to whether the required DHA can be synthesized by the infants themselves (from alpha- linolenic acid) or must be supplied by the diet - be it breast milk or infant formula. The researchers reviewed numerous studies comparing the DHA status of breast-fed infants with that of formula-fed ones. They found that over the first 6 months of life DHA accumulates in the body of breast- fed infants at a rate of 10 mg/day with 48% of this accumulation occurring in the brain. They estimate that an intake of 20 mg/day of DHA is required to achieve this accumulation and point out that breast feeding supplies about 60 mg/day. They believe the seeming over-abundance of DHA in breast milk may be needed in order to provide for potentially increased losses during disease, infection, surgery, and other conditions adversely affecting the infants' metabolism. On the other hand, formula-fed infants would seem to develop a serious deficiency of DHA if they are fed a formula which has not been fortified with DHA (usually in combination with arachidonic acid). Standard infant formulas contribute about 390 mg/day of alpha-linolenic acid so about 5.2% of this would have to be converted to DHA in order to produce the needed 20 mg/day. The researchers point out that there is no evidence at all that infants are able to achieve this conversion rate and speculate that the rate may be as much as 20 times lower than required. This conclusion is amply supported by the fact that formula-fed infants actually lose 993 mg of DHA over the first 6 months of life while breast-fed babies gain an average of 1882 mg. The accumulation of DHA in the brain of formula-fed infants is only half of that observed in breast-fed infants and while the liver in breast-fed infants gains 24 mg of DHA during the first 6 months the liver in formula-fed ones actually loses 136 mg. The researchers conclude that feeding infants with a non-fortified formula will not provide the DHA provided by breast milk. They urge further work to determine whether a formula containing at least 0.2% DHA (providing 60 mg/day of DHA) will provide equivalent DHA accumulation to that of breast-fed infants. *Cunnane, Stephen C., et al. Breast-fed infants achieve a higher rate of brain and whole body docosahexaenoate accumulation than formula-fed infants not consuming dietary docosahexaenoate. Lipids, Vol. 35, January 2000, pp. 105-11 /*

Docosahexaenoic acid fortifies breast milk

HOUSTON, TEXAS. Docosahexaenoic acid (DHA) is an important component of brain cell membranes; a deficiency during infancy has been linked to poorer brain development and a decline in visual acuity. DHA occurs naturally in breast milk, but is absent in most infant formulas. Surveys have shown that the DHA content in breast milk from American women tends to be lower than that in milk from women in most other countries. Researchers at the Baylor College of Medicine now report that the DHA content of breast milk can be increased by supplementing with DHA and that this higher DHA content is transferred to breast-fed infants. The study involved 26 pregnant women who planned to breast feed exclusively for at least eight weeks after giving birth.

The women were randomly assigned to one of four groups and given a daily DHA supplement or placebo from two weeks after giving birth to eight weeks after giving birth. Group 1 received an algae-produced triacylglycerol with a high DHA content (providing less than 230 mg/day of DHA); group 2 consumed two high DHA content eggs (providing 170 mg/day of DHA); group 3 took a low EPA, high DHA fish oil (providing 260 mg/day of DHA); and group 4 (the control group) consumed two regular eggs daily (providing less than 35 mg/day of DHA). All three forms of DHA supplements produced significant increases in the DHA content of the women's blood plasma (phospholipid phase) and breast milk. Consumption of two eggs per day over a six-week period was well tolerated by all participants and had no adverse effects on cholesterol or triglyceride levels. The DHA level in the blood plasma (phospholipid phase) of the breast-fed infants also increased significantly over the six-week supplementation period with the infants in groups 1 and 3 having the largest increases. NOTE: This study was supported by a grant from the Mead-Johnson Nutritional Group. [61 references] *Jensen, Craig L., et al. Effect of docosahexaenoic acid supplementation of lactating women on the fatty acid composition of breast milk lipids and maternal and infant plasma phospholipids. American Journal of Clinical Nutrition, Vol. 71 (suppl), January 2000, pp. 292S-99S/*

Infants need long-chain omega-3 fatty acids

KANSAS CITY, MISSOURI. It is well-established that human infants require an adequate supply of omega-3 and omega-6 long-chain polyunsaturated fatty acids for optimal growth and neural development. There is evidence that the need for omega-3 acids, particularly docosahexaenoic acid (DHA), is especially pronounced among pre-term infants. It has been suggested that these infants lack the ability to synthesize DHA from alpha-linolenic acid in sufficient amounts to ensure an adequate supply to the brain and retina. Several studies have shown that pre-term infants fed a formula with added DHA developed better visual acuity and retinal response to light and scored higher when evaluated for mental development. In term infants some studies, but not all, have found higher visual acuity and better problem-solving ability in infants fed a DHA-containing formula. Dr. S.E. Carlson of the University of Missouri supports the idea of adding DHA to infant formulas, but cautions that his fortification should be balanced with an appropriate addition of long-chain omega-6 acids (arachidonic acid) in order to more closely approximate the composition of mother's milk. *Carlson, S.E. Long-chain polyunsaturated fatty acids and development of human infants. Acta Paediatr Suppl, No. 430, 1999, pp. 72-7 /*

Your brain needs DHA

NEW YORK, NY. Dr. Barbara Levine, Professor of Nutrition in Medicine at Cornell University, sounds the alarm concerning a totally inadequate intake of DHA (docosahexaenoic acid) by most Americans. DHA is the building block of human brain tissue and is particularly abundant in the grey matter of the brain and the retina. Low levels of DHA have recently been associated with depression, memory loss, dementia, and visual problems. DHA is particularly important for fetuses and infants; the DHA content of the infant's brain triples during the first three months of life. Optimal levels of DHA are therefore crucial for pregnant and lactating mothers. Unfortunately, the average DHA content of breast milk in the United States is the lowest in the world, most likely because Americans eat comparatively little fish. Making matters worse is the fact that the United States is the only country in the world where infant formulas are not fortified with DHA. This despite a 1995 recommendation by the World Health Organization that all baby formulas should provide 40 mg of DHA per kilogram of infant body weight. Dr. Levine believes that postpartum depression, attention deficit hyperactivity disorder (ADHD), and low IQs are all linked to the dismally low DHA intake common in the United States. Dr. Levine also points out that low DHA levels have been linked to low brain serotonin levels which again are connected to an increased tendency to depression, suicide, and violence. DHA is abundant in marine phytoplankton and cold-water fish and nutritionists now recommend that people consume two to three servings of fish every week to maintain DHA levels. If this is not possible, Dr. Levine suggests supplementing

with 100 mg/day of DHA. *Levine, Barbara S. Most frequently asked questions about DHA. Nutrition Today, Vol. 32, November/December 1997, pp. 248-49/*

Mothers' fish oil supplementation benefits infants

PORTLAND, OREGON. Animal experiments have shown that monkeys born by mothers with low blood levels of docosahexaenoic acid (DHA) develop impaired vision. There is also evidence that premature human infants fed standard infant formulas (very low in DHA) have impaired visual function which can be improved significantly by adding fish oils to their formulas. All this adds to the growing evidence that DHA is essential for the proper development of the brain and retina in the fetus and infant. Researchers at the Oregon Health Sciences University recently set out to answer the question "Do high intakes of DHA by pregnant women increase the DHA level in their newborn infants?" Their clinical trial involved 31 healthy, pregnant women 15 of whom were assigned to receive 2.6 grams/day of omega-3 fatty acid from fish (1.01 grams DHA/day) from their 26th to their 35th week of pregnancy. The remaining women served as controls. The fish oil supplement was taken as a combination of tinned sardines and fish oil capsules; either 1 half tin of sardines plus 7 fish oil capsules per day, 1 tin of sardines (3 3/4 oz) plus 3 fish oil capsules per day or 10 fish oil capsules (10 grams) per day. Blood samples were collected from mothers at entry to the study, monthly after entry and at delivery, and from the infants at delivery. The level of DHA in the red blood cells of supplemented mothers rose from 4.69% (of total fatty acids) at entry to 7.15% at the end of week 34 and then declined (as expected) to 5.97% at delivery. DHA increases in the blood plasma paralleled the increase in the red blood cells, but at a lower level. DHA levels in newborn infants differed greatly depending on whether the mothers had supplemented or not. Red blood cell levels in infants born by supplementing mothers were 35.2% higher than in the control infants and blood plasma levels were 45.5% higher (5.05% vs. 3.47%). The researchers believe that supplementing pregnant mothers with fish oil may benefit brain and retinal development in their offspring particularly if born prematurely. They point out that supplementing from mid-pregnancy to the 34th week is perfectly safe and may reduce the incidence of preeclampsia (pregnancy-related high blood pressure) as well. *Connor, William E., et al. Increased docosahexaenoic acid levels in human newborn infants by administration of sardines and fish oil during pregnancy. Lipids, Vol. 31 (suppl), 1996, pp. S183- S87/*

Docosahexaenoic acid helps brain development

MILAN, ITALY. Researchers at the University of Milan report that infants whose formula contains long- chain polyunsaturated fatty acids [especially Docosahexaenoic acid (DHA)] have better brain development than children who do not receive DHA in their formula. The observation supports earlier findings that there is a direct correlation between the DHA concentration in the red blood cells of infants and their visual acuity. The researchers recommend that infants who are not breastfed be fed on a DHA- enriched formula. Breast milk already contains the fatty acids necessary for good brain development. / Agostoni, Carlo, et al. Docosahexaenoic acid status and developmental quotient of healthy term infants. The Lancet, Vol. 346, September 2, 1995, p. 638/ Coromega *Additional References* 1. Birch, E.E., et al. Visual acuity and the essentiality of docosahexaenoic acid and arachidonic acid in the diet of term infants. *Pediatric Research*, Vol. 44, August 1998, pp. 201-09 *Conclusion:* Supplementation with DHA appears necessary for optimal development of the brain and eyes of formula-fed infants. 2. Auestad, N., et al. Visual acuity, erythrocyte fatty acid composition, and growth in term infants fed formulas with long chain polyunsaturated fatty acids for one year. *Pediatric Research*, Vol. 41, January 1997, pp. 1-10 *Conclusion:* There was no improvement in growth or visual function in healthy term infants feed formula supplemented with DHA for 12 months. 3. Carlson, S.E. and Werkman, S.H. A randomized trial of visual attention of preterm infants fed docosahexaenoic acid until two months. *Lipids*, Vol. 31, January 1996, pp. 85-90 *Conclusion:* DHA-supplemented formula increases information processing speed in preterm infants. 4. Werkman, S.H., and Carlson, S.E. A randomized trial of visual attention of preterm infants fed docosahexaenoic acid until nine months.

Lipids, Vol. 31, January 1996, pp. 91-7 *Conclusion:* Preterm babies fed DHA-enriched formula had more rapid information processing. 5. Makrides, M., et al. Fatty acid composition of brain, retina, and erythrocytes in breast- and formula- fed infants. * American Journal of Clinical Nutrition*, Vol. 60, August 1994, pp. 189-94 *Conclusion:* Breast-fed infants have higher DHA levels in their cortex than do formula-fed infants. 6. Carlson, S.E., et al. Visual-acuity development in healthy preterm infants: effect of marine-oil supplementation. *American Journal of Clinical Nutrition*, Vol. 58, July 1993, pp. 35-42 *Conclusion:* Fish oil-fortified formula improves visual acuity in preterm infants. 7. Hoffman, D.R., et al. Effects of supplementation with omega-3 long-chain polyunsaturated fatty acids on retinal and cortical development in premature infants. *American Journal of Clinical Nutrition*, Vol. 57 (suppl 5), May 1993, pp. 807S-12S *Conclusion:* Fish oil-fortified formula improves visual and cortical function in preterm infants. 8. Hoffman, D.R. and Uauy, R. Essentiality of dietary omega-3 fatty acids for premature infants: plasma and red blood cell fatty acid composition. *Lipids*, Vol. 27, November 1992, pp. 886-95 *Conclusion:* Formula for preterm infants should be supplemented with omega-3 fatty acids including fish oils. 9. Birch, E.E., et al. Dietary essential fatty acid supply and visual acuity development. *Invest Ophthalmol Vis Sci*, Vol. 33, October 1992, pp. 3242-53 *Conclusion:* Fish oil-fortified formula improves visual acuity in preterm infants.

Please consult your health-care provider if you wish to follow up on the information presented.