

Prenatal Omega-3 Fatty Acids: Review and Recommendations

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KEY POINTS FROM THIS STUDY:

- 1) The influence of dietary omega-3 fatty acids on health outcomes is widely recognized.
- 2) Adequate intake of omega-3 fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) can increase gestation length and improve infant cognitive and visual performance.
- 3) Omega-3 fatty acids reduce the incidence of preterm births.
- 4) Women in the United States consume low levels of omega-3 fatty acids compared to omega-6 fatty acids; this dietary pattern is associated with poor health outcomes.
- 5) Omega-3 fatty acids are found primarily in fish, yet many pregnant women avoid fish because of concerns about potential mercury and polychlorinated biphenyl contamination.
- 6) An abundance of recent scientific publications confirm the positive health significance of dietary omega-3 fatty acids.
- 7) "A diet high in n-3 fatty acids is associated with decreased risks of heart disease, arthritis, asthma, and certain cancers."
- 8) "The antiinflammatory and antithrombotic properties of n-3 fatty acids play a major role in the maintenance of normal neurologic and visual function and cardiac health."
- 9) The n-3 fatty acid docosahexaenoic acid (DHA) is strongly linked to the regulation of allergenic immune responses.
- 10) "Fatty acids are used by every cell in the body; they are an integral part of cell membranes and influence the function of cell membrane receptors."
- 11) "Essential fatty acids are polyunsaturated fatty acids that cannot be synthesized by the body and must be obtained from dietary sources." The human body can produce all but two of the fatty acids it needs: omega-3 (n-3) fatty acids and omega-6 (n-6) fatty acids.
- 12) Diets high in n-6 fatty acids make potent inflammatory eicosanoids. Diets with adequate amounts of n-3 fatty acids make antiinflammatory eicosanoids.

- 13) "The primary sources of n-6s are grain-fed beef, processed foods, and liquid vegetable oils, and are abundant in the typical Western diet."
- 14) "DHA and EPA are critical to fetal growth and development and are particularly important to visual and cognitive function in newborns, children, and adults."
- 15) The conversion process of ALA to DHA and EPA is very inefficient. "Less than 5% of the alpha linolenic acid consumed is converted to DHA and EPA." **[Important]**
- 16) "The appropriate ratio of dietary n-6 to n-3 is important for optimal body function, and should be around 3:1 or 2:1." **[Important]**
- 17) N-6 to n-3 ratios have shifted from 1:1 in the early human diet to a ratio of approximately 20:1 currently, "largely because of the high intake of n-6-rich foods, such as processed food and meats, and lower intakes of n-3-rich foods."
- 19) "This dietary imbalance in the ratio of n-3 to n-6 intake is implicated in the development of chronic diseases, such as coronary artery disease, arthritis, cancers, and other inflammatory disorders." **[Important]**
- 18) Approximately 200 to 900 mg per day of DHA is recommended for adults.
- 20) The majority of pregnant women do not ingest adequate amounts of n-3s.
- 21) Low levels of DHA and EPA and an imbalance of n-6 to n-3 is linked to adverse pregnancy outcomes, including:
- Preeclampsia: Preeclampsia is characterized by an abnormal vascular response to placental development with associated vasoconstriction and increased vascular resistance.
 - Preterm Birth/Low Birth Weight
 - Fetal Growth Restriction
"DHA is essential to nerve cell processes, and it is theorized that cognitive disorders such as depression may be linked to n-3 intake.
 - Neonatal Outcome and Development

Neonatal and pediatric health benefits are linked to adequate prenatal n-3 intake during pregnancy. DHA is the most abundant fatty acid in brain, retinal, and neural tissue.

"Adequate maternal intake of n-3s has been correlated with improved neonatal visual development, central nervous system functioning, and improved childhood intelligence scores."

DHA and EPA promote immune cell development and are involved in modulating allergic inflammatory responses.

Higher n-3 levels in cord blood reduces the development of childhood allergic diseases, such as asthma, autoimmune diseases, atopic dermatitis, and allergic rhinitis.

N-3 fatty acids lower levels of pro-inflammatory cytokines, helping prevent and treat depression, cardiovascular disease, and other inflammatory conditions.

- 22) DHA levels in breast milk depend on maternal dietary ingestion of n-3s.
- 23) There is a positive association between maternal prenatal n-3 levels with blood pressure regulation in adult offspring.
- 24) Prenatal dietary n-3s are related to improvements in birth weight and in neonatal development.
- 25) Women should consume adequate amounts of n-3s during pregnancy.
- 26) "There is valid concern about the potential fetotoxic effects from fish consumption. Many of the oily fish high in n-3s are predators, and being higher in the food chain are therefore more likely to contain contaminants, such as mercury and polychlorinated biphenyls (PCBs)."
- 27) "Methylmercury is a well known potent neurotoxin, and PCBs are considered endocrine disruptors that are associated with reduced fertility and certain cancers."
- 28) "The FDA recently completed an extensive analysis of the risks of methylmercury and the benefits of consuming fish during pregnancy, and have concluded that eating fish has a significantly higher net benefit on childhood development than adverse effect from possible prenatal mercury exposure."
- 29) "N-6 fatty acids are found in sunflower, corn, sesame, and safflower oils, corn-fed beef, and most nuts."
- 30) "N-3s are also found in plants, such as flax seed, canola oil, and select leafy plants. It is a common misconception that adequate n-3s are obtained by eating these foods. As previously discussed, n-3s from these sources must be converted to DHA and EPA before they can be used. Because of the inefficiency of the process, only a very small amount is usable." **[Important]**
- 31) "DHA-rich microalgae are used to feed laying hens to produce DHA-enriched eggs. Fortified eggs have approximately 150 mg DHA per egg."
- 32) "It is highly likely that pregnant women need more DHA and EPA than non-pregnant women."
- 33) Purified fish oil is an alternative source of n-3s to eating fish.

- 34) "Cod liver oil is a good source of n-3s; however, it should be used with care in pregnancy because of the high amounts of preformed vitamin A and the theoretical potential for hypervitaminosis A and birth defects."
- 35) "Women following a vegan diet that excludes eating fish should be encouraged to supplement with algal oil capsules, because it is in fact the algae that fish feed on that make them a rich source of DHA."
- 36) "Advising women to eat two n-3-rich fish servings per week is a prudent and important component of prenatal nutritional counseling."
- 37) "Women should also be encouraged to reduce their intake of competing n-6s, which are found in processed foods and corn oil."
- 38) "The benefits of breastfeeding in providing n-3s for neonatal neural and brain growth when eating a diet high in n-3s should be promoted."
- 39) "Pregnant and lactating women and women considering pregnancy should avoid fish that are known to be high in mercury."
- 40) Choosing wild Alaskan salmon over farmed salmon will reduce PCB intake.
- 41) "Adequate n-3 intake in pregnant and nursing women and young children is acknowledged for its positive role in increasing gestation and birth weight and its effects on neonatal cognitive and visual function."
- 42) "Most pregnant women lack adequate n-3 intake because of a typical Western diet that can overfeed yet under nourish."
- 43) "The evaluation of dietary intake and strategies to increase intake to 200 to 300 mg DHA plus EPA per day in pregnancy is an essential component of midwifery nutritional counseling."

Fish Highest in Mercury to Avoid During Pregnancy

Fish	Mercury ppm
Tilefish	1.45
Shark	0.98
Swordfish	0.97
King mackerel	0.73
Fresh or frozen tuna steaks	0.35–0.63
Orange roughy	0.55
Marlin	0.45
Spanish mackerel	0.45