High-DHA SAP

Science-based high-dose DHA for optimal prenatal and postnatal health

Omega-3 polyunsaturated fatty acids (ω-3 PUFAs), docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA) have major roles in fetal and newborn neurodevelopment. Evidence supports that high DHA supplementation with a minimum amount of EPA could improve pregnancy outcomes, such as gestation duration, increase infant growth and enhance short- and long-term development of the offspring. Especially, DHA is actively involved in neuronal development and plasticity, receptor-mediated signaling, changes in membrane fluidity and anti-inflammation by interacting with key receptors.

High DHA fish oil supplementation has been shown to increase gestation duration and promote healthy birth weight and size, improve gestational diabetes and type 1 diabetes, reduce the risk of preeclampsia and deep placentation disorders. In addition, High DHA fish oil supplementation is suggested to have long term beneficial effects on infant growth including neurological and cognitive development and enhanced immunity.

High-DHA SAP may help increase gestation duration and promote positive pregnancy outcomes, ameliorate gestational diabetes. **High-DHA SAP** may help prevent the risk of preeclampsia and deep placentation disorders during pregnancy. **High-DHA SAP** consumption during pregnancy may provide new born infants and developing children long term beneficial effects such as enhanced immunity, neurological and cognitive development. Once breast feeding is over, **Trident 66:33 SAP** is suggested for the mother and for after 2 years of age, **Children's Trident SAP** would be optimal for the child. **High-DHA SAP** provides a clean source of high DHA and EPA per softgel equivalent to consuming 3 ounces serving portion of swordfish, which is known to contain very high levels of mercury and polychlorinated biphenyls

ACTIVE INGREDIENTS

Each softgel contains:

Fish oil	1327 mg
Providing	
Docosahexaenoic acid [DHA; 22:6(n-3)]	600 mg
Eicosapentaenoic acid [EPA; 20:5(n-3)]	120 mg

EPA and DHA supplied in an ethyl ester form

From wild, deep-sea fish oil: whole anchovies (*Engraulidae*) and/or whole sardines (*Clupeidae*). Molecularly distilled and/or Sueprcritical-CO_2 extracted

Other ingredients: Vitamin E (from non-GMO sunflower) in a softgel made of bovine gelatin, glycerin, and purified water.

Contains no: Gluten, soy, wheat, corn, eggs, dairy, yeast, citrus, preservatives, artificial flavour or colour, starch, or sugar.

This product is non-GMO.

High-DHA SAP contains 60 softgels per bottle.

DIRECTIONS FOR USE

Adults: Take 1 softgel daily or as directed by your healthcare practitioner.

INDICATIONS

High-DHA SAP may help:

- Increase gestation duration and promote positive pregnancy outcomes.
- Ameliorate gestational diabetes and help manage type 1 diabetes in pregnant women.
- Promote a healthy inflammatory response.
- Reduce the risk of preeclampsia and deep placentation disorders during pregnancy.
- Provide newborn infants and developing children enhanced immunity if consumed during pregnancy.
- Improve neurological and cognitive development in newborn infants and developing children.

KEY ATTRIBUTES

High-DHA SAP contains vitamin E as an antioxidant, and is hermetically sealed to be secure against entry of oxygen, ensuring maximum purity, freshness and stability of the oil through to expiration.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for each **High-DHA SAP** lot number have been tested by an ISO 17025 accredited third-party laboratory for identity, potency, and purity.

Scientific Advisory Panel (SAP): adding nutraceutical research to achieve optimum health

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351, Rue Joseph-Carrier, Vaudreuil-Dorion, Quebec, J7V 5V5
T 1 866 510 3123 • F 1 866 510 3130 • nfh.ca

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INTRODUCTION

Omega-3 polyunsaturated fatty acids (ω-3 PUFAs), especially docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA) have recently gained increased attention due to their crucial role in fetal and newborn neurodevelopment and their implications in inflammation. Increasing evidence supports that a high DHA supplementation with a minimum amount of EPA could improve pregnancy outcomes, such as gestation duration, increase infant growth and enhance short- and long-term development of the offspring.[1]

Docosahexaenoic acid (DHA, C22:6n-3) is a metabolically active major component of the long-chain PUFA family. DHA is synthesized from its parental precursor, the essential fatty acid alpha-linolenic acid (ALA, C18:3n-3) through a series of elongating and desaturating reactions. DHA is thought to be actively involved in neuronal development and plasticity, receptor-mediated signaling, changes in membrane fluidity, the formation of second messengers, and/or enhancement of the production of anti-inflammatory lipid mediators.[1,2,3] Especially, DHA serves as a substrate for the activities of lipoxygenase and cyclooxygenase enzymes, thus preventing the formation of pro-inflammatory arachidonic acid products.[1,2] DHA is found in very high levels in the central nervous system and retina, especially in gray matter and photoreceptors, which underscores its vital role in the optimal development of these regions.[1]

In addition, DHA has been found to interact as an agonist or an antagonist with several receptors such as plasma membrane bound Toll-like receptors (TLR), the G-coupled protein receptor (GPR)120, the nuclear receptor peroxisome proliferator activated receptor gamma (PPARγ), and the dopamine and serotonin receptors.[1]

DHA DURING PREGNANCY

DHA availability to the fetus is dependent on maternal diet and phospholipid composition.[1] During the last trimester of gestation coinciding with the maturation of brain and retina, DHA is preferentially transported to the infant and about 67 – 75 mg/day of DHA is accumulated *in utero* [1, 4, 5, 6]. An association between placental weight and DHA concentration has been established previously, and a correlation between placental weight and infant weight and length in preterm deliveries indicates that DHA levels within the placenta influence fetal growth patterns [7]. Research evidence from pre-clinical studies clearly suggest that early DHA exposure influences neural differentiation, neurotransmitter target finding and synaptogenesis during gestation, especially for optimal development of dopaminergic signaling.[1, 8] Noteworthy, DHA deficits are irreversible once the window for development is past.[1, 8]

GESTATION DURATION AND BIRTH SIZE

DHA supplementation induced reduction in early preterm and very-low birth weight are important clinical and public health outcomes. A meta-analysis reported an increase in mean gestational age and birth weight, and a decrease in the number of infants born prior to 37 weeks' gestation in mothers receiving ω-3 PUFA supplementation during pregnancy [9]. In a phase III, double-blind, randomized controlled trial, women (n = 350) consumed 600 mg/d of DHA from 20 wk of gestation to birth. DHA supplementation resulted in higher maternal and cord RBC-phospholipid-DHA, longer gestation duration and greater birth weight, length and head circumference compared to the placebo. In addition, the DHA group had fewer infants born at 34 wk of gestation and shorter hospital stays for infants born preterm compared to the placebo group.[10] In another similar study, a 1-d increase in gestation duration and an increase in birth weight of 67 g was observed following ω-3 PUFA supplementation.[11]

INFLAMMATION

One of the leading cause in complications of pregnancy, subsequent preterm birth, and neonatal neurological morbidities is inflammation [12]. Most inflammatory conditions associated with pregnancy, birth, and childhood are reported to involve cytokines TNFα and IL-1β [12]. Fish oil supplementation for 8 weeks has been shown to significantly decrease cytokine production by mononuclear cells [13].

Specialized pro-resolving mediators (SPM) generated from EPA and DHA are involved in the resolution of inflammation through an active process. ω-3 PUFA supplementation during pregnancy may provide an intervention strategy to modify these SPM. In a clinical study, the effect of ω-3 PUFA supplementation in pregnancy on offspring SPM at birth and 12 years of age was assessed in 98 atopic pregnant women who were randomized to 3·7 g daily ω-3 PUFAs or a control, from 20 weeks gestation until delivery. Plasma SPM consisting of 18-hydroxyeicosapentaenoic acid (18-HEPE), E-series resolvins, 17-hydroxydocosahexaenoic acid (17-HDHA), D-series resolvins, 14-hydroxydocosahexaenoic acid (14-HDHA), 10 S,17S-dihydroxydocosahexaenoic acid, maresins and protectin 1, were measured. ω-3 PUFA supplementation profoundly increased cord blood EPA-derived 18-HEPE and DHA-derived 17-HDHA at birth relative to the control, although, the same were not sustained at 12 years. However, future studies are required to understand the role and function of these SPM, particularly at birth and during development.

A recent study shows that DHA is a much effective modulator of inflammation markers compared to EPA.[15]

GESTATIONAL AND TYPE 1 DIABETES MANAGEMENT

Pregnancy is usually considered as a state of transient metabolic syndrome (MS) even in healthy, non-overweight women due to the metabolic alterations during physiological gestation, usually with a 60% decrease in insulin sensitivity.[16] As a result, overweight and obese women are at an increased risk of metabolic dysfunctions, i.e. gestational diabetes mellitus, preeclampsia and fetal overgrowth. [16]

The results of an uncontrolled pilot study suggested that DHA probably has more beneficial effect on insulin sensitivity compared to EPA in humans, however, more research is needed to compare the effects of EPA vs. DHA in separate interventional groups with different dosages.[17]

Evidence exists that pregnancy and ω-3 PUFAs exhibit suppressive effect on human inflammatory system. In a prospective randomized placebo controlled clinical study in 90 pregnant women with Type-1 diabetes mellitus (T1DM), 47 patients were put on a standard diabetic diet enriched with EPA and DHA twice a day (EPA 120 mg and DHA 616 mg) and 43 patients on standard diabetic diet with placebo.[18] The researchers reported significantly lower fetal blood C-peptide concentration in the ω-3 PUFA supplemented group compared to the control group. Overall, supplementing ω-3 PUFAs during pregnancy yields immunological tolerance and stimulates the production of endogenous insulin in women with T1DM.[18]

PRECLAMPSIA AND DEEP PLACENTATION DISORDERS

Pre-clinical evidence has demonstrated that DHA supplementation during pregnancy reduces placental oxidative stress and increases fetal and placental size. Placental oxidative stress may play a key role in the pathophysiology of deep placentation disorders.[19] In addition, defective deep placentation triggers oxidative stress that may lead to clinical disorders related to defective placentation. DHA supplementation has been shown to be associated with elevated markers of trophoblast proliferation, measured in placentas obtained at term of pregnancy. Future investigations evaluating the direct effect of DHA supplementation during pregnancy on placentation using placental bed biopsies are warranted.[19]

DHA REQUIREMENT IN PRETERM INFANTS

Preterm infants are especially vulnerable to DHA deficiency during critical windows of neurodevelopment, since a large proportion of the fetal DHA accumulation occurs during the last trimester [20, 21]. Nursing mothers have been documented to receive very low (23 mg) of DHA per day in their diet which in turn is reflected as 15 mg/100 mL of milk or 0.1–0.2% of the total fatty acid contents [1]. DHA enriched supplementation in both the infant and nursing mother is therefore highly important for premature infants.[1]

Clinical evidence supports that high DHA enriched fish oil supplementation (even up to 600 mg/d of DHA) resulted in significant benefits during pregnancy including reduction in early preterm and very low birth weight.[10]

INFANT DEVELOPMENT AND GROWTH

Human milk is a natural source of DHA, providing around 7 mg dl–1 DHA with 12-month lactation [22]. It is known that 50–60% of the dry adult brain weight is fatty acids, with ω-3 PUFAs representing a large proportion of it. The availability of specific fatty acids during development is likely to be important in neurocognitive function [1]. Evidence suggests that post-natal DHA supplementation results in improved neurodevelopmental outcomes for preterm infants [23].

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