



Docosahexaenoic Acid Intake and Status of US Toddlers

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BACKGROUND

- Docosahexaenoic Acid (DHA) is the most abundant omega-3 fatty acid in the brain.
- Brain DHA accumulates until at least 2 years of age, however, accumulation may depend on DHA intake¹.
- Blood and other tissue DHA levels are influenced by dietary consumption.
- Most US infants receive DHA from either mother's milk or DHA-supplemented infant formula during the first year of life.
- Data from NHANES (1999-2000) indicate US children under six years of age typically consume relatively low amounts of DHA (0.02g/d) and other long chain polyunsaturated fatty acids (PUFA) (9g/d)².
- The DHA intake and status of toddlers in the US has not been systematically evaluated.

PURPOSE

- The purpose of this observational study was to determine the typical DHA intake and status of middle-class US toddlers aged 18 to 36 months.

PARTICIPANTS

- 86 middle-class US toddlers already enrolled in a nutrition intervention study.
- Inclusion and exclusion criteria were those for the primary study (Table 1).
- Blood samples and dietary recalls were available.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
18–36 months of age	Active infection
10 th –90 th percentile weight-for-length	Breast milk consumption at enrollment
Daily milk consumption	History of underlying disease
Live at home with parent(s)	Cow's milk intolerance
Successful venous blood draw	From a multiple birth

METHODS

Dietary Intake

- Independent multiple-pass 24-hour recalls were obtained at 3 time points (0, 1, and 2 mo after enrollment).
- Energy, total fat, and fatty acid intakes were determined by Nutrient Data System for Research (NDS-R) software.
- Average intakes for each child were used to improve reliability.
 - 3 reliable recalls were available for 76 of the subjects.
 - 2 reliable recalls were available for 7 of the subjects.
 - 1 reliable recall was available for 2 of the subjects.
 - 0 reliable recalls were available for 1 subject.

Fatty Acid Analysis

- A blood sample was drawn from the antecubital vein at enrollment.
- RBC and plasma phospholipid (PL) DHA levels were analyzed according to published techniques³. Reported values were corrected for response (wt%, mg/ml) using Supelco 37 mix and concentrations were determined against an internal standard (17:0).

RESULTS

- Mean ± SD nutrient intakes are shown in Table 2.

Table 2: Nutrient Intake (mean ±SD) of Study Participants

Nutrient	Mean	±SD
Energy (kcal)	1184	278
Total fat (g)	44.7	13
PUFA (g)	7.1	3
18:2 n-6 (g)	6.3	3
18:3 n-3 (g)	0.7	0.8
DHA (mg)	22	28

- Percent RBC total and plasma PL DHA by weight % and concentration are shown in Table 3.
- DHA intake was significantly correlated with both weight % RBC total and weight % plasma PL DHA ($r = 0.325$ and 0.349 , respectively).
- Approximately 10% of the total variance in RBC and PL DHA was accounted for by DHA intake.

RESULTS (cont.)

Table 3: Percent RBC total and plasma phospholipid DHA by weight and concentration of total fatty acids

	% by weight of total fatty acid	mg/ml of packed RBC or plasma
RBC total	2.8 ± 0.8	42 ± 21
PL DHA	2.5 ± 0.7	32 ± 11

SUMMARY

- The dietary DHA intake was low as anticipated.
- The DHA intake of our study population was similar to that previously found in US children less than 6 years of age.
- Based on the low amount of variance accounted for by dietary DHA intake, it appears at very low intakes, other factors may account for DHA status.

LIMITATIONS

- Intakes based on 24-hour dietary recalls
- NDS-R database limited to 10mg intervals for dietary DHA.

References

1. Martinez M. Tissue levels of polyunsaturated fatty acids during early human development. *J Pediatr* 1992;120:S129-38.
2. Ervin RB, Wright JD, Wang CY, et al. Dietary intake of fats and fatty acids for the United States population: 1999-2000. *Adv Data* 2004;348:1-6.
3. Smuts CM, Huang M, Mundy D, Plasse T, Major S, Carlson SE. A randomized trial of docosahexaenoic acid supplementation during the third trimester of pregnancy. *Obstet Gynecol*. 2003;101:469-79.

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