

Lipids and PCBs in Fish and Algal Oil Supplements

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ABSTRACT

A limited sampling and analysis of commercial supplements found 51-124% eicosapentaenoic acid (EPA) and 61-153% docosahexaenoic acid (DHA) as provided on product labels. Daily intakes of EPA plus DHA when following label recommendations would provide 123-1087% of the Adequate Intake (AI) for pregnant and lactating women (i.e., 0.13-0.14 g/day) and up to 43% of the daily Reference Dose (RfD) for PCB for a 60 kg person. However, if a smaller amount of the supplements were taken to meet the AI, only 0.9-11.5% of the RfD for PCB would be obtained. Algal oil supplements did not have detectable PCB residues, but those products only provided DHA and not EPA.

INTRODUCTION

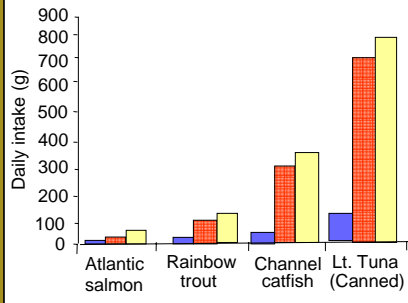
Omega-3 fatty acids, predominantly EPA (C20:5n-3) and DHA (C22:6n-3), are important for brain development. Fish oil is a favored dietary source for these fatty acids because it provides higher amounts than vegetable oils.

Currently, the average amount of 'prepared' fish consumed by women (ages 15 to 44 years) is 11.31 g/day. To meet the daily intakes recommended by several organizations for EPA plus DHA, a significant amount of fish must be consumed (Fig. 1). It is apparent that consumers either need to: eat the appropriate amount of certain species or take a dietary supplement if they want to meet the daily intakes recommended by ISSFAL or AHA.

Fish oils may contain contaminants, such as polychlorinated biphenyls (PCBs), which have been associated with deficits in fetal and postnatal growth. PCB cross the placenta and can get transferred to the infant in breast milk.

The objectives of this study were to verify the supplement facts claims for EPA and DHA as provided on commercial product labels and to measure PCB residues in fish oil and algal oil dietary supplements.

Figure 1. Daily intake of fish required to meet recommended intakes for EPA plus DHA



Organization Legend

- NAS (National Academy of Sciences - Adequate Intake): 0.13-0.14 g/d set for pregnant and lactating women
- ISSFAL (International Society for the Study of Fatty Acids and Lipids: 0.65 g/d for adult
- AHA (American Heart Association): 1.0 g/d for people who have coronary heart disease.

METHODS

A single bottle of 24 commercial fish oil supplements and 2 algal oil supplements were purchased from local stores around Lafayette, Indiana. From a single bottle, oil from ten capsules was combined to obtain a composite sample. Two composites from each bottle were analyzed in duplicate for omega-3 fatty acids using GC/FID (AOAC Official Methods of Analysis, 9991.39) and for PCB residues using an ELISA.

RESULTS

The concentrations of EPA and DHA in 24 fish oil supplements were between 51- 92% and 61- 97%, respectively, of the amounts stated on the label. Two algal oil supplements contained between 128 and 162% of the DHA listed on the label.

Figure 2. Percent of recommended intakes for EPA plus DHA when following label.

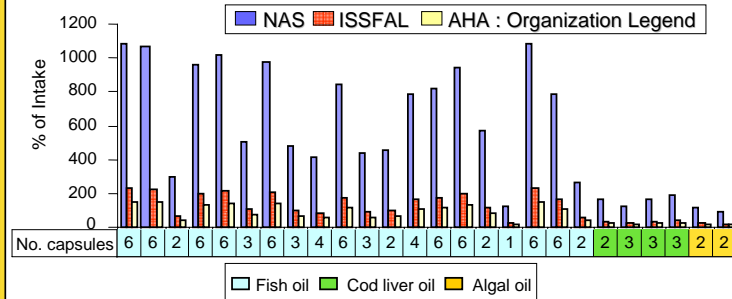


Figure 3. Percent of RfD for PCB when following label.

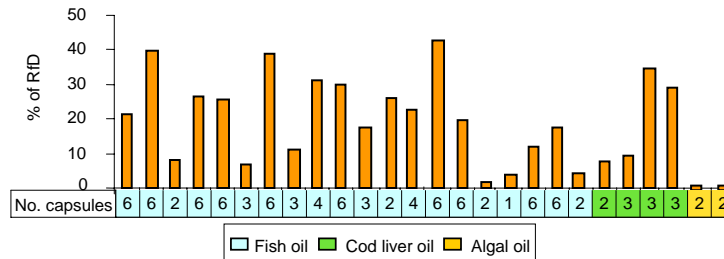
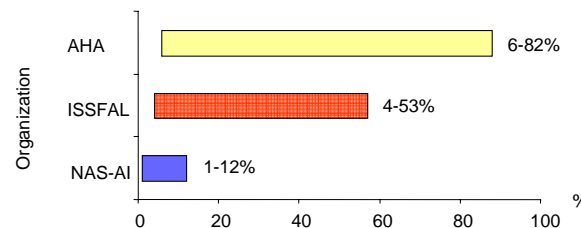


Figure 4. PCB intake as % of RfD at recommended daily intakes of EPA + DHA



CONCLUSIONS

- EPA and DHA concentrations ranged from 51 to 153% of the amounts stated on the Supplement Facts label.

- Intakes of EPA plus DHA that are recommended by some organizations (ISSFAL and AHA) may require higher intakes of fish than practical and may encourage use of a dietary supplement.

- Most label recommendations encourage higher intakes of EPA and DHA than the current AI (0.13-0.14 g/d of EPA plus DHA) for pregnant and lactating women.

- The intake of PCB when following label recommendations for the 24 products was between 2 and 43% of the RfD. However, if the dietary supplements are taken to just meet the AI, then exposure to PCBs drops significantly to 1-12% of the RfD.

- PCB concentrations in 2 algal oil supplements were found to be below detection limits; however, algal oil supplements are lacking in EPA.

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