

Mercury and Long-Chain Fatty Acids in Canned Fish

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ABSTRACT

Canned tuna (n=240), salmon (n=16), and mackerel (n=16) were analyzed for mercury and fatty acids. Mean mercury residues were 188, 45, and 55 ppb, respectively, and were well below the FDA Action Level of 1000 ppb. 'Chunk Light Tuna in Water' contained lower mercury (\bar{x} = 50 ppb) when compared to all other tuna products; however, other tuna products were higher in EPA (eicosapentaenoic acid) plus DHA (docosahexaenoic acid). Salmon and mackerel had lower mercury residues but provided higher EPA plus DHA than canned tuna. This information will help women of childbearing age to limit their intake of mercury while obtaining important long-chain omega-3 fatty acids from fish.

INTRODUCTION

Canned fish is a good source of protein, vitamin D, and minerals. Fish consumption also has been associated with improved pregnancy outcomes because of high amounts of omega-3 fatty acids, particularly, EPA and DHA (Allen and Harris 2001). The fetus and the nursing infant obtain beneficial omega-3 fatty acids from their mothers through placental exchange or breast milk.

However, fish and seafood can be the major source of exposure to contaminants such as methylmercury. Methylmercury is toxic to the nervous system and developing brain. Damage to the pre- or post-natal nervous system can occur if the mother is exposed to excessive methylmercury during pregnancy or lactation, since mercury can pass through the placenta and milk. CDC has reported that (2002) 8% of women have levels of mercury in their bodies that exceed safe limits (5.8 µg/L in blood). Moreover, Environmental Protection Agency estimated that 15% (630,000) of newborns may be exposed to excessive mercury in the womb (Washington post 2004). Hence, exposure to methylmercury during pregnancy and infancy is of particular concern. Therefore, consumers should be aware of both the benefits and the risks from eating fish, including canned fish.

The objective of this study was to determine the concentrations of mercury and fatty acids in canned tuna, salmon, and mackerel.

METHODS

Five brands of canned tuna (n=240), two brands of canned salmon (n=16), and two brands of canned mackerel (n=16) were purchased from local stores around Lafayette, Indiana. From each lot, two cans were combined and homogenized thoroughly to obtain a composite sample. Four composite samples from each lot were analyzed in duplicate for total mercury content using Thermal Decomposition (Gold) Amalgamation - Atomic Absorption (TD-AAS). The determination of fatty acids was carried out using the AOAC Official Method, 991.39 (AOAC 2000) and modified Folch method.

RESULTS

Figure 1. Mercury or EPA plus DHA in Canned Fish.

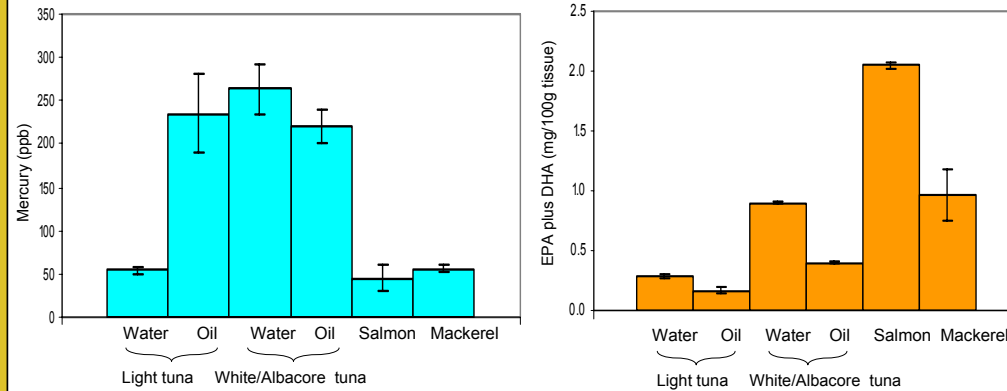
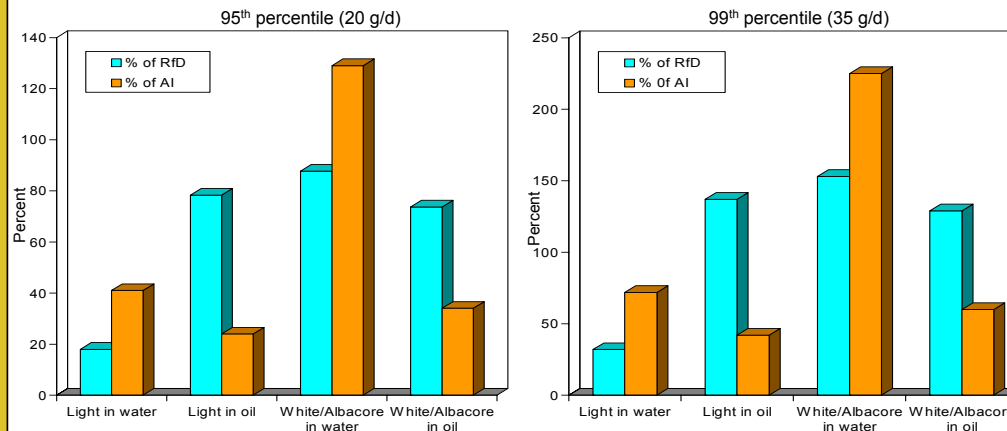


Figure 2. Mercury exposure (% of RfD^a) and intake of EPA plus DHA amount (% of AI^b) from consumption of canned tuna^c for women of childbearing age (15-44 yrs, 60 kg-bw).



^a RfD (Reference Dose) for methylmercury: 0.1 µg/kg/day, ^b AI (Adequate Intake) of EPA plus DHA for pregnant and lactating women: 0.13-0.14 g/d (10% of AI for α -linolenic acid), Estimated usual intake of canned tuna for women of childbearing age were 20 g and 35 g/d for 95th and 99th percentile, respectively (FDA 2000)

In order to meet safe limits (RfD, 0.1µg/kg-bw/d) for mercury, the mercury concentration in fish tissue should be below 185 ppb for 60 kg-bw women of childbearing age who consume 8 ounce of fish per week.

CONCLUSIONS

- Mercury and omega-3 fatty acids in canned tuna varied with type of tuna, color standard, and packing media.

- Women of childbearing age that are consuming canned tuna (99th percentile, 35 g/d) are projected to receive 153% of the RfD for mercury.

- In order to protect at-risk populations, the Action Level for fish should be reduced to 185 ppb or products should be labeled with an appropriate warning.

- To get sufficient EPA plus DHA without exceeding the RfD, certain types of canned fish would be good options for pregnant or lactating women.

- The concept of a "kid-safe" label is supported for light tuna in water.

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