

Health Benefits and Risks in Seafood Consumption: Special Emphasis on Albacore Tuna

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There is a disparity about what we read in the popular press and what research is discovering about seafood consumption and this is caused mainly by issues surrounding mercury (Hg). Mercury is a ubiquitous compound that is in the natural environment through both natural events (volcanoes) and anthropogenic activities including emissions from coal-fired plants. Once in the environment Hg can be transformed to the more harmful organic form of methyl mercury (MeHg) which in high concentrations can have devastating effect on the nervous system especially the fetus. More than fifty years ago, by direct contamination of Minimata Bay, Japan with Hg, the world witnessed these effects and named it Minimata disease. Because of this and other outbreaks in Iraq the FDA and other world health organizations have put a limit of MeHg in foods between 0.5 and 1.0 ppm. Most of the MeHg we consumed in our diet is through seafood. All fish and shellfish have varying levels of MeHg in their flesh. In general, larger fish have the higher the levels of MeHg due to a process called bioaccumulation. Small and mid-size fish will tend to have reduced levels of MeHg as they consume even smaller organisms in the food chain.

There are two basic questions with regard to Hg in seafood. The first question is at what Hg concentration levels are there demonstrable harmful effects, especially for the fetus. The second question is a benefits/risk scenario, that is, when do potential risks of Hg in seafood outweigh the benefits from seafood consumption that are well documented. With regard to the first question, there are two major epidemiological studies that scientists and advocates point to for determining potential harmful levels. These are commonly referred to as the Scyhcelles Island study and the Faroe Island study. Both are long-term (> 10 years) studies that measured maternal Hg levels and have done extensive cognitive testing on the off-spring. Unfortunately for those wanting clarity on the issue the Faroe Island study showed positive effects in some of the cognitive tests related to Hg consumption when the Scychelles Island study showed no effects. These are major studies, following more than 500 families over a ten-year period. As one would expect there are differences in these studies than advocates point to promote their point of view. The main source of Hg in the Faroe Islands is from pilot whale meat which may have confounding factors such as low selenium (which counters toxic effects of Hg) and high levels of organochlorides. Critics of the Seychelles study say that the cognitive tests (more than 50 types of tests) are not sensitive enough to pick up nuances of MeHg toxicity. So the jury is still out on whether there are low-level toxic effects from MeHg in seafood. However, the Environmental Protection Agency (EPA) has decided to use the Faroe Island study as a benchmark for developing their BDL explain

With regard to risk/benefit analysis there has been considerable work to demonstrate that seafood consumption greatly outweighs the risks. There has been an exceptional amount of high-quality publications in medical journals and scientific health journals showing the positive benefits of fish consumption and health. While most lay-

persons know the positive link between seafood consumption and reduction of coronary heart disease, it is also becoming evident of the role seafood and the long chain polyunsaturated fatty acids and improving cognitive function in infants, and mental health. Therefore, we can ask ourselves, if we reduce our seafood consumption because of perceived risks what are the health consequences in the long run. Several researchers at the Harvard School of Risk/Benefit Analysis have done just that and published a series of papers in 2005. In looking at different scenarios of changes of fish consumption patterns because of advisories they found that reduction of fish consumption would significantly reduce quality adjusted life-years (QALYs) for society as a whole even when considering low-level toxic compounds such as Hg. They concluded that there are so many beneficial compounds in seafood, it would be risky to reduce the levels of consumption especially seafood that has high levels of long chain omega-3 fatty acids.

This was actually one of the messages, that unfortunately, did not come through in the joint EPA-FDA advisory for women of child bearing age and young children. Americans are very risk-adverse and tend to focus on the parts of the advisory that advised against eating certain species of fish (shark, swordfish, tilefish and King mackerel). Albacore tuna (aka white tuna) was found to have higher levels than light tuna (usually skipjack tuna) and the advisory asked that 6 oz. of this species. **This was based on FDA studies that showed canned light tuna had only 0.12 ppm on average compared to canned albacore which has 0.37 ppm Hg. A study by the Oregon State University Seafood Laboratory showed that troll, bait, and line caught albacore off the West Coast of the U.S. had lower levels at 0.14 ppm in 2003 and 0.17 ppm of Hg in 2006 as their size is smaller than albacore caught in tropical waters by long-lines. It was also shown that these tunas have very high levels of long-chain omega-3 fatty acids such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) which have health benefits such as reduction of coronary heart disease and improved cognitive development in infants.** The second point in the advisory urge women of child-bearing age to eat 12 oz of preferably a variety of low-Hg fish per week because of the health benefits. The average consumption in the U.S. is approximately 5 oz. so the advisory was saying that people should be increasing their consumption of seafood. However, nutritionists are concerned that the wrong message, that of limiting seafood consumption, is being focused on by the general populace even among health-care professionals. Articles such as the June 2006 issue of Consumer Reports further confuse the consumer and often spotlight a negative image of seafood, Hg and risk. This article claims that “their scientists”, unnamed in the article, found that even light tuna might prove hazardous to pregnant women and the fetus. This type of information, however well-intentioned, only creates a level of fear and mistrust in the consumer and does a disservice to society as a whole. Recent articles in *Lancet* and the *New England Journal of Medicine* show that the health benefits greatly outweigh any potential risks in seafood consumption. One group of authors stated that increased seafood consumption could reduce coronary heart disease in this country by 36%. Research on the effects of selenium and health show that high levels of selenium in ocean-caught fish can minimize Hg risk. This presentation will highlight the Hg in seafood debate, address recent findings and show that seafood remains an excellent choice for all consumers in providing health benefits for society.