



Risks and Benefits of Fish Consumption: Yes, Mercury is a Problem



Executive Summary

Prepared by Edward Groth, PhD

For

Oceana

and

Mercury Policy Project

December, 2005

Executive Summary

Longstanding concerns about the health hazards of methyl mercury, combined with growing evidence that eating fish offers nutritional benefits, have recently amplified debate about food safety aspects of fish consumption. Because of the challenges inherent in communicating with the public about health risks and benefits, many consumers may perceive conflicting messages. Should they eat more fish—since it’s good for the heart? Should they avoid certain fish—because the mercury (and other pollutants) they might contain could be bad for them, for their children or (if they are a mother-to-be) for their baby? The 2004 consumer advisory on mercury in fish issued by the U.S. Food and Drug Administration (FDA) and Environmental Protection Agency (EPA) for the first time mentions limiting consumption of canned tuna (the most heavily eaten fish product in the US), heightening interest even further.

Potential confusion on this subject has been exacerbated by messages from commercially interested parties, most notably, the tuna industry, which has run ads urging people to eat more tuna (fish with low to moderate mercury content). The tuna industry, and other special interest groups, have aggressively promoted the idea that eating fish is completely safe, arguing that the mercury in fish poses no health hazards.¹ Some have also suggested that warnings about health hazards like mercury could make consumers eat less fish, and thereby make them lose benefits of fish consumption.²

The self-serving industry message that mercury in fish poses no risk to health is not scientifically defensible. While some have promoted risk-benefit analysis to answer the question of whether consumers should eat fish, that approach is too simplistic. The idea that policy can be based on a trade-off of risks against benefits, when the two are like apples and oranges, is misguided and sends a misleading message to consumers. This is not an either/or choice. By carefully choosing the fish they eat, people can benefit from consuming seafood, while also minimizing their risk from mercury exposure associated with fish in the diet.

This report summarizes the science on both the risks of mercury and the benefits of fish consumption. The truth is, mercury in fish poses health hazards worthy of concern. At the same time, fish consumption offers health benefits. To reap the health benefits while minimizing the risks associated with mercury, consumers need accurate information on which fish may be most beneficial, and which may be harmful and should be consumed less frequently or not at all. Information about risks is not toxic—methyl mercury is toxic.³ Information is empowering; people with the facts can make smarter choices at the seafood counter.

Empowering consumers with the information they need to make informed choices is eminently feasible. Some government agencies, non-governmental organizations, and retailers have already begun working together toward the goal of more effective risk communication about exposure risks from eating fish.⁴ The goal of all parties in this debate should be to develop and share accurate, balanced, useful information that puts benefits and risks in perspective and helps consumers make informed choices.

Based on a review of the best available information, this report offers the following key findings:

There is enough mercury in certain fish to pose health risks, especially for heavy and moderate fish consumers, women of child-bearing age and children. Multiple lines of evidence clearly demonstrate that methyl mercury in fish represents a real and significant health hazard. Based on the federal definition of “safe” exposure, developed by the EPA, people who eat fish one or more times a week can easily exceed that level, especially if they eat fish varieties that accumulate moderate to high levels of mercury.

- Swordfish contains about 1 part per million (ppm or $\mu\text{g/g}$) of methyl mercury on average.⁵ One six-ounce serving contains four times the weekly recommended dose of 42 μg for a 130 pound woman.
- A six-ounce can of albacore tuna, at 0.35 ppm,^v gives a person who eats it about 1.5 times the safe weekly dose for a 130 pound woman.
- A 44 pound child has a safe weekly mercury intake of 14 μg .⁶ If that child ate one can of albacore tuna per week, her mercury intake would be four times her safe weekly dose.

The EPA definition of “safe” exposure to methyl mercury is not over-protective; more likely, it is not protective enough. EPA applied a 10-fold uncertainty factor to a dose of mercury that caused clear adverse effects on the developing brain, in the best available epidemiological study. Special interests, particularly the tuna industry, have challenged the EPA “reference level” as arbitrary, called the 10-fold “safety factor” excessive, and argued that current exposure to methyl mercury in the United States is safe. However, the safety margin in the EPA reference level is quite narrow when compared with consensus, science-based public-health practices for defining safe exposure to toxic substances.⁷ Much larger safety factors, some as high as 1000-fold (or 100 times the factor applied to mercury exposure), have been used by the EPA in setting pesticide exposure limits, for example.⁸

Many of the scientific justifications for larger uncertainty factors could have been applied to methyl mercury, but in this case, the EPA settled for a lower safety factor due to countervailing societal interests: the benefits of fish consumption, and the economic impracticalities of achieving a significantly lower exposure target. For decades, it has been accepted that satisfactory definitions of “safe” exposure must include substantial safety margins. The debate should be about whether the 10-fold safety margin applied by the EPA to methyl mercury exposure is adequate, not about the false assertion that exposures just below the harmful level are safe.

Potential health effects associated with mercury, but not considered in the current definition of “safe” exposure, may mean mercury poses wider risks than recognized. Some studies have linked mercury exposure with an increased risk of heart disease,⁹ a decline of neurological functions in the elderly,¹⁰ and damage to the immune system.¹¹ This evidence suggests that mercury in fish may be a concern for everyone, not just

women and children, but “safe” exposure in terms of these other hazards cannot be defined since data are limited.

Contrary to alarming industry and media messages, fish consumption in the United States has been steadily increasing and is now at an all-time high. Fears that people might eat less fish if informed of potential health hazards like mercury appear to be substantially unfounded. Fish consumption in the United States has increased 12% since the first FDA mercury advisory was issued in 2001.¹² More people are aware of the benefits of eating fish than of the risks from methyl mercury exposure.¹³ Most people are unaware of the government advisories concerning mercury in fish and associated risks.¹⁴

A study by the Harvard Center for Risk Analysis (HCRA), widely cited as a basis for those alarming messages, has serious methodological weaknesses, and its results have been mischaracterized. HCRA carried out a major analytical study of the benefits and risks of fish consumption, funded largely by the tuna industry.¹⁵ The study used hypothetical scenarios, based on imagining how consumers might react to dietary advice, to project risks and benefits of changes in fish consumption. Publicity about the study has stressed the theme that “Warnings about hazards in fish may do more harm than good.”¹⁶ But the study actually concluded that if pregnant women choose low mercury fish over high mercury varieties (as the EPA and FDA recommend), without decreasing their overall fish consumption, there would be enormous public-health benefits from lower mercury exposure, with no loss of nutritional benefits.

One HCRA scenario projected a substantial net negative public health impact if all adult Americans ate much less fish, out of fear of mercury warnings, and lost out on benefits to the heart. This “doomsday” result got the most media attention, but it was based on an extremely unrealistic assumption—all adults would cut back their fish consumption drastically because of mercury warnings. There is actually no credible evidence to support that assumption—it is truly imaginary, and as a result, so are the projected net negative health impacts.

Interestingly, HCRA compared the benefits and risks to the developing brain of its hypothetical changes in fish consumption, and the effects of mercury were three to 10 times greater than the effects of beneficial nutrients in every scenario. However, this conclusion was not publicized by either the authors or the sponsors, nor was it picked up by the media.

People can enjoy the benefits that fish provide and avoid the risks of mercury by choosing low-mercury fish. This common-sense conclusion was strongly supported by the HCRA study. To help women and others meet these goals, dietary advice needs to be more clearly communicated. This can be done effectively at the point of sale.

Recommendations

The best current scientific evidence shows that mercury levels found in some fish pose significant public health hazards, especially for the developing fetus, children and adults who eat a lot of fish, but also that the benefits fish consumption can be achieved while minimizing the risk from mercury, by choosing low-mercury fish. Oceana and the Mercury Policy Project therefore make the following recommendations:

- Heavy fish eaters, women of childbearing age and parents of young children should choose lower-mercury fish to keep their mercury doses within safe limits. Women whose body weights are well below average (say, less than 110 pounds) and parents of young children should exercise even greater care.
- To support the FDA/EPA dietary advisory, grocery stores, should post signs alerting consumers to the varieties of fish the government has issued advisories about.
- FDA should require grocery stores to post signs alerting consumers to the varieties of fish for which the government has issued advisories.
- Consumers who eat fish more than a twice a week, or often eat high-mercury fish, should ask their doctor to get their blood tested for mercury.

References and Notes

- ¹ Many examples of denial of the evidence of mercury hazards and promotion of increased fish (and specifically, tuna) consumption are accessible on the US Tuna Foundation web site. For example, see http://www.tunafacts.com/news/eat_more_fish_081505.cfm. For examples of special interest groups making the same argument, see Swarc, S., *Fishy Advice: The Politics of Methylmercury in Fish and Mercury Emissions*, Competitive Enterprise Institute, December, 2004; Schwartz, J., "Clear Foolishness," American Enterprise Institute, March 2005; Soon, W., "More on Eating More Fish," Annapolis Center for Science-Based Public Policy, available at <http://acsh.org>.
- ² For example, see "Study Finds Government Advisories on Fish Consumption and Mercury May Do More Harm Than Good," Press Release, Harvard School of Public Health, October 19, 2005. Available at <http://www.hsph.harvard.edu/press/releases/press10192005.html>.
- ³ Information may, however, be hazardous to the sale of certain products. The tuna industry has sued the State of California in an attempt to block a state requirement that the mercury content of certain fish (tuna among them) be disclosed to consumers at the point of sale. See press release posted on BusinessWire, 9:41 PM October 19, 2005, "Tuna Canners Take Attorney General to Task; Opening Statements Given in Trial That Could Determine the Future of Healthy Eating In California."
- ⁴ See for example Oceana press release, "Concerned Moms Urge Supermarkets to Post Warning Signs for Mercury-Tainted Seafood," November 17 2005; also, Heckman, C., "Grocery chains post fish warnings," Seattle Post-Intelligencer, October 20, 2005; Galehouse, M., "All Safeways to carry mercury warnings," The Arizona Republic, October 20, 2005.
- ⁵ For FDA data on mercury levels in fish, see <http://www.cfsan.fda.gov/~frf/sea-mehg.html>.
- ⁶ Based on the EPA reference dose: $20 \text{ kg} \times 0.1 \text{ } \mu\text{g/kg/day} \times 7 \text{ days} = 14 \text{ } \mu\text{g}$.
- ⁷ For a discussion of the history and application of "safety factor" and "uncertainty factor" approaches, see National Research Council (1994), *Science and Judgment in Risk Assessment*. Washington, DC: National Academy Press, pages 30-31 and 60-63.
- ⁸ The use of an additional safety factor is specifically required by the Food Quality Protection Act, passed in 1996, which provides for EPA's regulation of pesticide residues in foods. For a discussion of the FQPA, its requirements, and the basis for them, see Benbrook, C.M., E. Groth, et al. (1996), *Pest Management at the Crossroads*. Yonkers, NY: Consumers Union of US, Inc.
- ⁹ For reviews of this literature, see Stern, A.H. (2005), A review of the studies of the cardiovascular health effects of methylmercury with consideration of their suitability for risk assessment. *Environ Res* **98**:133-142; also, Konig, A., et al. (2005), A Quantitative Analysis of Fish Consumption and Coronary Heart Disease Mortality. *Am J Prev Med* **29**(4):335-346.
- ¹⁰ For example, Yokoo, E.M., et al. (2003), Low level methylmercury exposure affects neuropsychological function in adults. *Environmental Health: A Global Access Science Source* **2**:8. Also, Newland, C.M. and E.B. Rasmussen (2003), Behavior in Adulthood and During Aging Is Affected by Contaminant Exposure in Utero. *Current Directions in Psychological Science* **12**(6):212-217. Also see Rice et al. (2003), Note 26, above, for discussion.
- ¹¹ Grandjean, P., et al. (1997), Cognitive deficit in 7-year-old children with prenatal exposure to methyl mercury. *Neurotoxicol Teratol* **19**:417-428; National Research Council (2000), *Toxicological Effects of Methylmercury*. Washington, DC: National Academy Press.
- ¹² National Marine Fisheries Service (2005), Fisheries of the United States, 2004. Page 79, Per Capita Consumption. Silver Spring, MD: National Ocean and Atmospheric Administration. The referenced table contains data on per capita fish consumption since 1910. Per capita consumption rose from 12.5 to 15.5 pounds per year during the 1980s, fluctuated around 15 pounds per year from 1990 to 2001, and has risen for the last three years to 16.6 pounds per capita in 2004. The NMFS statistical report is available at http://www.st.nmfs.gov/st1/fus/fus04/fus_2004.pdf.
- ¹³ Burger, J. (2004), Fishing, fish consumption, and knowledge about advisories in college students and others in central New Jersey. *Environ Res* **98**:268-275.
- ¹⁴ Oceana (2005), Mercury in Seafood: Shoppers Have A Right to Know. Discusses survey. Available at http://www.oceana.org/fileadmin/oceana/uploads/mercury/1081.MercuryPollingReport_HI-RES.pdf.
- ¹⁵ The published package included eight separate papers. See also "Did NFI, tuna foundation money influence Harvard seafood mercury study?" Ben DiPietro. Intrafish. October 21, 2005. Teutsch, S.M. and J.T. Cohen (2005), Health Trade-offs from Policies to Alter Fish Consumption. *Am J Prev Med* **29**(4):324. Konig, A., et al. (2005), A Quantitative Analysis of Fish Consumption and Coronary Heart Disease Mortality. *Am J Prev Med* **29**(4):335-346. Bouzan, C., et al. (2005), A Quantitative Analysis of Fish Consumption and Stroke Risk. *Am J Prev Med* **29**(4):347-352. Cohen, J.T., D.C. Bellinger and B.A. Shaywitz (2005), A Quantitative Analysis of Prenatal Methyl Mercury Exposure and Cognitive Development. *Am J Prev Med* **29**(4):353-365. Cohen, J.T., D.C. Bellinger, W.E. Connor and B.A. Shaywitz (2005), A Quantitative Analysis of Prenatal Intake of n-3 Polyunsaturated Fatty Acids and Cognitive Development. *Am J Prev Med* **29**(4):366-374. Cohen, J.T., et al. (2005), A Quantitative Risk-Benefit Analysis of Changes in Population Fish Consumption. *Am J Prev Med* **29**(4):325-334. Willett, W.C. (2005), Fish: Balancing Health Risks and Benefits. *Am J Prev Med* **29**(4):320-321. McMichael, A.J. and C.D. Butler (2005), Fish, Health and Sustainability. *Am J Prev Med* **29**(4):322-323.
- ¹⁶ The headline of Harvard's press release used almost those exact words (see release at <http://www.hsph.harvard.edu/press/releases/press10192005.html>.) The Boston Globe headlined its article the next day, "Fish warnings taken too far." Other stories had much the same tone and emphasis.