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Fish: The Methylmercury Dilemma

Here is a quick summary of the first of the fish dilemmas: fish are good to eat for their nutritional value, and especially for their content of omega-3 fats. But all seafood is contaminated with methylmercury, a toxic substance that is dangerous for a developing fetus—especially during the early months of pregnancy. The amounts of methylmercury in fish vary widely, and it is a good idea to avoid eating the most contaminated kinds. To do this, you need to know which fish have the most methylmercury. Avoiding it sounds simple enough, but like much else about fish, the methylmercury dilemma is inevitably complicated by politics.

This fish story starts in 1994, when the FDA issued its first "advisory" about methylmercury in seafood. Mercury, the FDA said, could be quite elevated in waters near industrial pollution. As a result, predatory fish like shark, swordfish, and albacore tuna (the expensive "white" tuna that you eat as steaks or from cans) could have amounts that exceed levels considered safe. For most adults, the FDA considered these fish "safe, provided they are eaten infrequently (no more than once a week) as part of a balanced diet." But because nobody really knows the amount that is safe to eat, the advice for pregnant women was more restrictive. The FDA said that pregnant women—and women who *might* become pregnant—should not eat shark or swordfish more than once a month.

The 1994 FDA advisory said not a word about restrictions on albacore tuna. This kind of tuna has less methylmercury than shark or swordfish, but three times more than the smaller and cheaper varieties—the "chunk light" tunas that you usually find in cans. But Americans eat more tuna than any other predatory fish. So the FDA's omission of an advisory for albacore tuna seemed an odd oversight. It is best explained by the FDA's regulatory mission, which is to balance health risks against cost considerations, among them costs to industry. Albacore tuna clearly belonged on the list of fish to avoid, but advice to restrict its consumption would surely affect the livelihoods of people who fish for, can, and sell tuna. Because hardly anyone knows the difference between one kind of tuna and another, fish companies worried that consumers would interpret advice to avoid albacore tuna as advice to avoid *all* tuna. Industry lobbyists urged the FDA to keep albacore tuna off the methylmercury advisory. Somehow, albacore tuna got left off.

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FEDERAL ADVISORIES: FDA AND EPA

At this point, another federal agency enters the picture—the Environmental Protection Agency (EPA). The EPA is responsible for protecting the health of the public against pollutants in air and water. Since toxic contaminants in water get incorporated into fish, the EPA issues advisories about which fish are safe to eat—particularly those caught for sport and private use. In 1999, Congress directed the EPA to commission a report from the National Research Council (NRC) about the toxic effects of methylmercury. The NRC often recruits scientists to write reports on matters that affect government policy, and Congress wanted it to help the EPA set safety standards for levels of methylmercury in the body.

The NRC produced its report in 2000. You can interpret the conclusions of this report as reassuring or not. The NRC said that if you eat an

average amount of fish, you have a low risk of harm. But if you eat a lot of predatory fish, you "might have little or no margin of safety," meaning that your intake of methylmercury could be uncomfortably close to levels considered unsafe. Because methylmercury is most harmful during fetal development, the risks are highest for children born to women who eat a lot of seafood during pregnancy. The possibility of harm, said the NRC, is so great that it might increase

> the number of children who have to struggle to keep up in school and who might require remedial classes or special education. Because of the beneficial effects of fish consumption, the long-term goal needs to be a reduction in the concentrations of [methylmercury] in fish rather than replacement of fish in the diet by other foods.

Important as this goal might be, the NRC did not discuss what needed to be done to reach it. Instead, the NRC concluded that "In the interim, the best method of maintaining fish consumption and minimizing [mercury] exposure is the consumption of fish known to have lower [methylmercury] concentrations." The report also did not identify what those desirable fish might be.

In 2001, the FDA used this report as the basis for an update of its mercury advisory. Since the advice of the two agencies—EPA and FDA—can be hard to follow, I've summarized the progression of advice over time in the Table on the facing page.

In its 2001 advisory, the FDA warned pregnant women to avoid eating four kinds of fish—shark, swordfish, king mackerel, and tilefish—but said it was safe to continue eating all other fish twice a week as long as amounts did not exceed 12 ounces in total. Once again, the FDA said nothing about the danger of methylmercury in albacore tuna, which is eaten much more frequently than those other four fish.

Indeed, because so few people eat those fish regularly, this advisory did not get much attention—except from the Environmental Working Group (EWG). This "public interest watchdog" organization had a different interpretation of the data on methylmercury exposure than the FDA's. According to the EWG's analysis, if pregnant women ate other fish twice a week, especially albacore tuna, at least one quarter of them

Evolution of Government Advice to Pregnant Women (and Women Who Might Become Pregnant) About Methylmercury in Commercial Fish

ADVISORY	FISH HIGH IN METHYL-MERCURY	ADVISABLE TO EAT	ALBACORE TUNA	OTHER FISH
FDA, 1994	Shark Swordfish	Once a month	No limits	No limits
FDA, 2001	Shark Swordfish King Mackerel Tilefish	Never	No limits	Twice a week (12 ounces total)
FDA and EPA, 2004	Shark Swordfish King Mackerel Tilefish	Never	Once a week (6 ounces)	Twice a week (12 ounces, of which 6 ounces can be albacore tuna)

would be taking in levels of methylmercury that come uncomfortably close to unsafe. The FDA's weak advice, said the EWG, "fails to meet standards for accuracy and scientific integrity" and, if followed, would actually "increase the number of women of childbearing age with unsafe levels of mercury in their blood."

In response to this charge, the FDA explained that it could not issue more restrictive advice because the results of its focus-group testing indicated that women would misinterpret that kind of advice. If the FDA said to "limit" fish intake, women would think they should *never* eat fish. The EWG was not convinced by this explanation; it filed a Freedom of Information Act request for the documents related to the FDA's mercury advisory. These documents revealed that the FDA originally planned to include warnings about tuna steaks and canned tuna in its advisory, but dropped them after three meetings with representatives of the tuna industry. The documents also provided evidence for a different interpretation of the focus-group results. The EWG's interpretation was that most women understood quite well that they only needed to avoid fish high in methylmercury. The documents showed that FDA officials had met

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with many groups that urged stricter standards for methylmercury, but only paid attention to advice from the tuna lobbyists. One tuna lobbyist told *The New York Times*, "I certainly hope we had an impact because we showed them the nutritional benefits of tuna."

Following these revelations, the FDA asked its Food Advisory Committee for help in dealing with the methylmercury problem. The committee honed in on the inconsistencies in the FDA and EPA standards for safe levels of mercury, especially as applied to tuna—the fish eaten most often by American women. These inconsistencies occur as a result of the different mandates of the advising agencies. The FDA regulates commercial seafood and considers the effects of harm to the industry as well as to human health. The EPA sets standards for fish caught by people who fish for sport or personal consumption, and only considers risks to the health of people who eat such fish; it is not supposed to consider risks to the industry. Because, as I will soon explain, virtually all waterways in the United States are heavily contaminated with methylmercury or other chemical pollutants, the EPA's safety limits are invariably stricter than those of the FDA. The NRC writes reports and is just advisory, but if the FDA did what the NRC suggested in 2000, it would have to tell pregnant women that they should never eat albacore tuna and should only eat the cheaper kinds of canned tuna once a month if at all.

The Food Advisory Committee urged the FDA and the EPA to get together and issue just one set of recommendations for methylmercury, and the two agencies did so in March 2004. Given the antiregulatory climate in Washington at the time, their joint advisory reflected the more relaxed standards used by the FDA in 2001. The advisory said that if you are in any of four categories—a woman who might become pregnant, a pregnant woman, a nursing mother, or a young child—you should avoid shark, swordfish, king mackerel, and tilefish altogether, but you can eat up to two meals (12 ounces total) a week of low-mercury seafood like canned light tuna, among others. Children should eat proportionately less. But, the agencies said, because albacore tuna has more

mercury than canned light tuna, only one of those meals could be albacore tuna.

The joint advice for eating sports fish said nothing about eating commercially caught types that are high in methylmercury, but did say you should eat fish caught by friends only once a week (friends don't let friends eat fish?). If you do eat fish caught for sport, said the FDA and the EPA, you should not eat any other fish that week, and you also should not let your kids eat much sports fish, if any.

Although federal advice was becoming a bit more restrictive, the Environmental Working Group thought it was still way too lax. By its analysis, the FDA and the EPA should have included albacore tuna in the "do not eat" category for pregnant women, along with a list of other kinds of commercial fish and sports fish that exceed standards for methylmercury. Because that list is so long (and, perhaps, because one fish seems much like another to most people) this advocacy group argued that the FDA and the EPA should have instructed pregnant women not to eat any other fish—except those lowest in methylmercury—more than once a month.

The tuna industry, however, was greatly relieved by the joint federal advisory. The Tuna Foundation placed a large advertisement in national newspapers headlined "Plain Talk About Canned Tuna, a Safe & Healthy Food for Everyone," with these facts, among others:

> Fact: The omega-3 fatty acids found in canned tuna are considered "wonder nutrients" for pregnant and nursing women . . . Fact: Canned light tuna has very low levels of mercury . . . Fact: FDA and EPA also make it clear that pregnant women can eat albacore, which is also low in mercury . . . So, follow the advice of FDA and EPA and nearly every other health organization in America, and make canned tuna an important part of your family's balanced diet.

Note that figuring out how to follow advice about methylmercury is *your* problem to solve. *You* have to remember which fish are high in methylmercury so you can avoid them. *You* have to keep track of the amounts of fish you eat in a week or a month. And *you* have to decide whose information is more believable—the FDA's, the EPA's, the Tuna Foundation's, or the Environmental Working Group's.

If anything, this task is likely to become more difficult, not less. In the year following the 2004 joint FDA and EPA advisory, sales of tuna in the United States fell by 10 percent. The tuna industry asked the USDA to sponsor a "checkoff" generic advertising program for tuna, similar to the programs in place for beef, pork, soybeans, and other commodities. The campaign would be called "Tuna—a Smart Catch," would attempt to convince the public that tuna is a "wonder food," and would emphasize tuna's health benefits: less fat than beef or pork, no carbohydrates, and omega-3s.

What I find astonishing about the methylmercury dilemma is that neither the government nor the fish industry is doing much to resolve it in the most obvious way—by dealing with its cause and keeping mercury from getting into fish in the first place. The reason? As always, politics.

THE POLITICS OF MERCURY EMISSIONS

The FDA and EPA advisory should have made everyone realize the importance of keeping mercury out of waterways, but the politics of methylmercury involve much more than the interests of the tuna industry. Mercury gets into water from two sources: natural (volcanos and the weathering of cinnabar-containing rock), and "anthropogenic," meaning the result of human activity—in this case, coal-fired power plants. In the United States, power plants are the leading source of mercury contamination and are responsible for about 40 percent of mercury emissions. In response to the 2004 advisory, the National Resources Defense Council, an environmental advocacy group, and MoveOn.org, a group organizing grassroots opposition to the administration of President George W. Bush, sponsored a joint advertisement headlined "First Arsenic, Now Mercury: George Bush's EPA and the Politics of Pollution." The ad went on to say:

> America learned this week that tuna, and many other fish, can contain harmful levels of toxic mercury . . . So why is President Bush trying to weaken controls on mercury pollution? . . . Now, he wants the EPA to let coal-fired power plants treat their mercury pollution as "non-hazardous" even though mercury threatens pregnant women and children. The Bush administration's ploy would allow coal-fired power plants to put more mercury into the air, where it rains down on lakes and oceans, is swallowed by fish, and could wind up on your plate . . . Guess who is praising this scheme? Coal power companies, who are big mercury polluters and big political contributors, too.

Coal-burning power plants send forty or more tons of mercury into the atmosphere every year. During the 1990s, under the administration of President Bill Clinton, the EPA imposed rules that reduced mercury emissions from most other industries—except power plants. In 2000, with the environment-friendly vice president Al Gore running for president, the EPA decided to take on this last remaining source and ruled that power plant emissions violated the Clean Air Act. If coal-burning power plants cleaned up their emissions, they could achieve a 90 percent reduction in mercury by 2008. The EPA proposed to force them to do so. In 2003, however, Bush administration appointees at the EPA reversed that decision. Journalists who wondered how such a thing could happen soon found out that White House staff not only consulted lobbyists for the power industry but actually let the lobbyists "edit" the rules to minimize the emission hazards. Whenever the EPA rules said something like "mercury poses confirmed hazards to public health," the White House changed it to something like "emissions of mercury warrant regulation."

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The editing imposed by the Bush administration also gave power companies an additional decade—until 2018—to reduce emissions by 70 percent rather than 90 percent, and allowed them to trade pollution rights among themselves (meaning a company with low methylmercury emissions could trade its allowances to a company that exceeded the emissions limits). White House staff did not allow EPA officials to comment on the changes and told those who disagreed with the changes not to press the matter. The edited rules were to go into effect in March 2005. As word of all this leaked out, complaints poured in and by June

2004 more than 600,000 letters had been sent to the EPA, mostly opposing the weakening of the rules. In 2005, nine states and several major health associations—like the American Public Health Association, the American Academy of Pediatrics, and the American Nurses Association—filed a lawsuit challenging the more permissive standards, but the Bush administration continued to argue that weaker standards were sufficient and to oppose all attempts to restore the stronger proposals.

You might think that the fish industry, eager to make sure that its products could be eaten safely by women and children as well as men, would be right at the vanguard of efforts to strengthen controls over mercury emissions, but not a chance. When I asked the most active seafood trade association, the National Fisheries Institute, if it had filed comments calling for stronger controls on mercury emissions and, if so, what the institute had said, its communications director wrote back: "This just in: we did not file comments." To my query "Why Not?," there was no response. Instead of doing everything possible to get emissions reduced, the fish industry takes the short-term tack and publicly ignores or tries to minimize methylmercury as a health problem.

As for recreational fishing, the EPA announced in August 2004 that virtually all sports fish are so contaminated with methylmercury that forty-eight states (exceptions: Wyoming and Alaska) have issued advisory warnings to residents not to eat fish from certain waters. Indeed, nineteen states have placed all of their lakes and rivers under advisories. The top EPA administrator, Michael Leavitt, told *The New York Times*, "Mercury is everywhere." He was not exaggerating. The EPA collects information about state fish advisories on its Web site. I looked up New York, my home state. Its advisory tells me that I am not to eat more than half a pound per week of fish caught in any freshwater stream or river, and I am allowed only one meal per month from the 90 lakes and streams contaminated beyond federal standards. If I am under age fifteen or pregnant, I must never eat fish from those waters. Even Idaho, famous for its pristine waters, has plenty of contaminated lakes. Its advisory says that if you catch fish from those lakes, you need to have them tested

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for mercury, and the Idaho site provides a list of laboratories that will do this for you for a fee. Here, too, the obvious implication is that protecting yourself against methylmercury poisoning is *your* responsibility—not that of the state or federal government.

CONFLICTING RECOMMENDATIONS: OMEGA-3S VERSUS METHYLMERCURY

The various stakeholders—fishers, fishmongers, the canning industry, environmental advocates, and government and private health agencies—are clearly at odds over what to tell you to do about eating fish. If you like eating fish, you have some hard choices to make without having anywhere near the amount of information you need to make those choices sensibly. My approach to this dilemma is to ask two questions.

First question: how important is it to eat omega-3 fatty acids from fish? Fish are the best sources of omega-3 fats, but the amounts of EPA and DHA in three ounces of fish vary from 0.1 gram in cod to a gram or more in fish like anchovies, herring, mackerel, tuna, and salmon. The richest source of omega-3s turns out to be caviar (5.5 grams) but you would have to be rich as well as greedy to eat three ounces; sturgeon eggs cost more than $50 per ounce and the higher quality Russian and Iranian caviars can run more than $150 per ounce. Most American fish are relatively low in omega-3s, but, fortunately, it only takes small amounts of EPA and DHA to produce benefits.

Fish are not the only sources of omega-3s. Chicken and eggs naturally have small amounts of EPA and DHA (and are commonly eaten so they are an important source). Plants also contain omega-3 fats, but in the form of alpha-linolenic acid. Your body slowly converts this fatty acid to EPA and DHA. All food plants—beans, nuts, and seeds, but also fruits and vegetables—contain alpha-linolenic acid, although in much smaller amounts than the EPA and DHA in fish. The better plant sources are cooking oils made from seeds like flax and canola (as I explain in the chapter devoted to fats and oils). You also can get omega-3s by taking fish oil supplements, although the thought of these reminds me too much of the cod liver oil I was forced to swallow as a kid. Happily, the supplements come in capsules these days so you don't have to taste them.

Finally, it helps to keep omega-3s and fish in perspective. Omega-3s may be good for the heart, but so are other nutrients—vitamins, minerals, phytochemicals, and fiber—in the vegetables, nuts, and seeds that also contain alpha-linolenic acid. Fish, as I pointed out earlier, are excellent sources of many nutrients, but you can also get those nutrients from other foods. Fish are not essential requirements of healthful diets, and there is no compelling nutritional reason to eat fish if you don't like to.

Second question: how dangerous is mercury at current levels of fish eating? It troubles me that so little information is available to answer this question. Fish are not routinely tested for levels of methylmercury, and tests done by federal agencies produce results that differ from those done by environmental advocacy groups. Neither you nor Wegmans knows how much methylmercury is in that mako shark on display and whether that shark should bear a warning label: "If you are pregnant (or likely to become pregnant), do not eat me." Recent information suggests that blood levels of methylmercury are low in American women and declining, but perhaps 8 percent of women are within striking distance of levels considered harmful. Studies of the effects of "moderate" methylmercury intake on child development give inconsistent results. The children of women in New Zealand, the Faroe Islands, and some other places where predatory fish are eaten regularly display more than the usual number of problems with memory, attention, and language. But studies of children in the Seychelles, where pregnant women frequently eat fish that are lower on the food chain, have not shown such effects. This apparently reassuring result (which suggests that eating small fish is not evidently harmful) leads some commentators to conclude that "For now there is no reason for pregnant women to reduce fish consumption below current levels, which are probably safe." *Probably* safe?

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Perhaps methylmercury has to be eaten at Minamata-like levels before it causes overt harm, but do we really know that? If it turns out that methylmercury is similar to lead in the way it causes problems in the body, no level of methylmercury intake can ever be considered safe. Some hopeful studies suggest that omega-3 fats cancel out the toxic effects of methylmercury, but others suggest that the reverse is also true: methylmercury blunts the protective action of omega-3s. The amounts of methylmercury in fish may not be demonstrably harmful, but there is no evidence whatsoever that methylmercury is good for you. That is why mercury emissions are such an important issue, remote as coal-burning power plants may seem from the fish you buy at supermarkets.

DEALING WITH THE METHYLMERCURY DILEMMA

How much of what kind of fish you can safely eat depends on what fish it is and who you are. Since you have no way of knowing the methylmercury content of a particular fish, the best you can do is guess. Methylmercury does not seem harmful for adults at current levels of intake, but it is demonstrably bad for early fetal development and if you are a woman it is best not to have much of this toxin in your body before you become pregnant. Methylmercury attaches to red blood cells and does not generally get into breast milk, but nursing infants readily absorb whatever is there. If you are pregnant, thinking (or not thinking but "at risk") of becoming pregnant, or nursing an infant, why take a chance? You will not eat shark, swordfish, tilefish, king mackerel, albacore tuna, or any other predatory fish at the top of the food chain; you will politely decline to eat fish caught by your friends or anyone else who fishes for fun; you will eat other fish in small amounts, if at all; and you will feed your children even smaller amounts (how much smaller, nobody knows, but caution suggests as little as possible). Even if you are not pregnant, and not likely to become pregnant, you should still say no to predatory fish and limit the amounts of other fish you say yes to.

At the moment, the only practical way to deal with the fish dilemma is to carry a seafood card from an advocacy group that lists the fish lowest in methylmercury. On the bright side, the safest tuna (canned chunk or light tuna that is not labeled "white") is likely to be the least expensive, and methylmercury, unlike lead, does not stay in the body for long. Its "half-life" is just two or three months, meaning that if you start now to

reduce the amount of methylmercury you eat, half will be gone in a few months, half of what's left will disappear in another few months, and most will be gone in a year or so, along with any risks it might pose. That is why reducing mercury emissions now, rather than years from now, makes such good sense.

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The Fish-Farming Dilemma

If you are going to follow heart-healthy advice to eat two servings of fish a week, you will need to know more than you ever wanted to about the diets of fish, as well as your own. Did the fish eat smaller fish? If so, they might have not only methylmercury but also more than their share of other dilemma-inducing pollutants—PCBs (polychlorinated biphenyls) and related toxic chemicals. The PCBs in fish cause the same type of dilemma as the one involving omega-3s and methylmercury, but with one unpleasant addition: all fish have PCBs, but farmed fish—those fed fish meal and fish oils—have more. This is because farmed fish need proteins and fats to help them grow; they grow better when those nutrients come from fish meal and oils, but these feeds contain high concentrations of PCBs.

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As I will soon explain, the number of fish in the ocean is declining rapidly. If you are going to continue to have fish to eat—and to contribute omega-3s to your diet—something has to be done to increase the fish supply. Fish farming seems like an obvious way to produce more fish. But if farmed fish are fed fish oils loaded