

Field and Stream Report: The Truth about Mercury and the Fish You Eat

Article by Hal Herring.

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It is the most basic of human rights: to fish for food, to take from the bounty of our waters a healthy meal for ourselves and our families. The practice is as old as mankind, from a caveman bent over a river with a sharpened stick to a modern angler powering a cast into the waves with a surf rod. But that right is under a grave threat. --Most fishermen today are familiar with some form of fish consumption advisories, because almost every state has waters that are contaminated by industrial chemicals or other toxic substances such as dioxin or polychlorinated biphenyls (PCBs). Dealing with toxins is one of the saddest facts of being a sportsman in the modern world. And while federal and state agencies have made progress in reducing many kinds of water pollution, one poisonous substance is very much on the increase, and it may turn out to be more dangerous than all the others combined. --That substance is mercury--the most widespread and pervasive toxin now found in the fish that we like to pursue and eat. To date, 45 states have fish consumption advisories for mercury. In December 2003, the Food and Drug Administration (which monitors fish that are sold commercially) collaborated with the Environmental Protection Agency (which monitors

fish caught by sportsmen for private consumption) to issue a comprehensive warning on eating mercury-contaminated fish.

A Toxin Through History

People have known the dangers of mercury since the Roman empire, when slaves who worked in the "quicksilver" mines invariably died after less than three years. More recently, the expression mad as a hatter arose because mercury was used to preserve beaver pelts in the 19th century, and the craftsmen who made the hats would become bald and suffer from severe muscular tremors and dementia, including uncontrollable fits of laughter.

But the most terrible instance was identified in 1956, in Minimata Bay, Japan, where a chemical company dumping mercury caused a rash of ghastly birth defects and afflicted thousands of people with what came to be known as Minimata disease. Stray cats, which had long survived by scavenging from the many fish-packing businesses in this port city, were the first to show symptoms of poisoning. Investigators puzzled over the mysterious "dancing cat disease," so called due to the bizarre muscular spasms that wracked the cats before they died. It was the first time in history that the phenomenon of bioaccumulation came to the attention of scientists.

There is nothing complex about the process. Mercury is a naturally occurring toxin, found in soils, rocks, wood, and fuels like coal and oil. Simple soil erosion deposits mercury in rivers and lakes, but concentrations remain low, unless, as has been discovered in the recently deforested regions of the Amazon, erosion reaches extraordinary levels. Burning wood also releases some mercury that has been taken up from the soil by trees.

But of all the sources of mercury, it is our burning of coal to generate electric power that is the single greatest con-

tributor to the problem. Mercury that naturally occurs in the coal is released during burning and enters the air; it is then precipitated into the oceans, lakes, and rivers by rain. According to the EPA, coal-fired power plants in the United States emit about 48 tons of mercury into the air every year--and more than half of this mercury falls within 10 kilometers of the plant itself. When it reaches the water, microorganisms consume it and convert it into a substance called methylmercury.

Into the Food Chain

A study at the University of Tennessee recently rated methylmercury among the most dangerous poisons on Earth (just behind plutonium). It has no known beneficial use, and it accumulates in the muscle tissue of fish, animals, and humans. When minnows eat plankton or algae that is contaminated with methylmercury, it is deposited in their flesh; larger fish prey upon the minnows, and the toxin travels straight up the food chain to our most revered and noble gamefish--the big predators like bass, pike, walleyes, brown trout; and to all the finest food and sport fish of the seas--tuna, swordfish, marlin, halibut. According to the EPA, fish at the top of the aquatic food chain bioaccumulate methylmercury to a level approximately 1 million to 10 million times greater than dissolved concentrations found in surrounding waters.

Of course, when you climb one more rung up that food chain, you find us, the fishermen of the world and the millions of people who buy their fish from their local supermarket. Just like the predatory fish that we catch and eat, we store mercury in our tissues. Just like the ancient Romans, we know that high exposure to mercury is fatal. But according to the EPA and other government agencies, it is the gradual buildup of mercury over a lifetime of low-level exposure that poses the most widespread risk.

Women and Children First

At the greatest risk are young children

and women who hope to become mothers. A recent report from the Centers for Disease Control found that one in 12 women of childbearing age has elevated mercury levels. Birth defects can occur even with amounts too low to cause illness in the mother.

Mercury is a neurotoxin, which means that its effects are primarily concentrated in the brain and central nervous system. The least horrific of the related birth defects are the ones that are the most difficult to measure--impaired brain development, leading to diminished memory, vision, coordination, and learning ability, especially difficulties with attention span and language skills. The same problems are associated with high levels of mercury in young children, whose nervous systems continue to develop until age 14.

Federal and state advisories focus on how much and what species of fish can be hazardous to women and children, but there are increasing signs that adult men, and women beyond childbearing age, are also at risk. "One of the problems with the advisories is that they can make [mercury] seem like a women's issue only," says Dr. Jane Hightower, an internist at the California Pacific Medical Center in San Francisco, who is conducting extensive research into how elevated levels of methylmercury impact human health. "And that is not correct. I am seeing people that are ill from this all the time."

Hightower believes that we are just beginning to understand how the toxin, at different levels, affects individuals. "We have the data from Minimata Bay and other places regarding the effects of mercury poisoning," she says. "At a certain level of contamination you will see muscular tremors, hair loss, personality disorders, birth defects, inability to concentrate, and various illnesses. We know that for a fact. But the evidence has been trickling in for years that much lower mercury levels are linked to heart attacks, impaired car-

diovascular function, muscle and joint problems. I have patients with a host of similar symptoms, who have not been able to get a conclusive diagnosis for what was wrong with them, and the common link we found was elevated mercury levels."

Hightower also says that accumulated mercury undermines the overall function of the body. "Whatever your weakness," she says, "[mercury] will make it worse."

A Threat to Rich and Poor

Hightower's studies have so far focused on upper-income patients from around the San Francisco Bay area--people who eat a lot of big, predatory fish like tuna and swordfish. "But I'd like to work with the sport and subsistence fishermen, too," she says. "This is clearly a growing problem for both the poor who fish for their food, and the wealthy who buy the more expensive kinds of fish."

Hightower worries that many of the advisories available to fishermen are so complicated that they might be ignored. "The California advisory that comes with your fishing license is very good, and if you try to follow those rules, you can catch and eat fish that are healthy for you. But let's be clear about this: If you are eating fish all the time--I had one guy who ate 30 meals of fish a month--you are going to be in trouble. You have got to pay attention. Don't freak out about this; just pay attention. I tell people that they've got to rotate their poisons. Don't eat the same thing day after day."

Coincidentally, the new FDA-EPA fish consumption advisory was issued in the same month that the EPA released new proposed federal regulations to control mercury emissions from coal-fired power plants. Such regulations have never existed.

Mercury Rising?

In 1997, the EPA under the Clinton ad-

ministration presented a detailed study that revealed the hazards of mercury contamination, pinpointed coal-fired power plants as the leading source of emissions, and promised action. But nothing was done. The EPA had begun work on a plan to address mercury pollution in December 2000; in a 2001 presentation, the agency said that 90 percent of mercury emissions from coal-fired power plants could be cut, using what is known as the Maximum Achievable Control Technology (MACT), by 2008.

Many environmental and fishing organizations expected that, with mercury pollution having attained such a high profile, the Bush administration would follow the MACT plan, but that was not to be. Instead, the EPA has unveiled a very different set of regulations that promises to reduce overall mercury levels by 70 percent by 2018. The new policy places them under a "cap and trade" system, where polluters trade "credits" for complying with the law. According to an EPA press release, this approach will be "the most cost effective way to achieve reductions." Indeed, such a strategy has shown success in reducing the emissions that cause acid rain.

But Felice Stadler, the National Wildlife Federation's national policy coordinator for their Clean the Rain Campaign, has worked on the mercury issue for the past four years and believes that the cap and trade system, as it applies to mercury, is a disaster. "Mercury is far too toxic to be placed under this system," she says. "Under the Bush plan, you will have seven times more mercury released into the waters than if we just simply followed the Clean Air Act as it is written today. There will be no overall reduction in mercury. Every other major source of pollution has been subject to the requirements of the Clean Air Act, until now. The Bush administration has simply decided that the coal-fired power industry will be exempt."

Several states have already decided that the federal plan is too lax. New Jersey announced in December that it will follow the MACT plan. Massachusetts and Iowa may do the same. Michigan remains undecided. But these are states where the coal industry has less power, and it is extremely doubtful that Montana or Kentucky, both at the edge of a new boom in coal-fired power plant construction, or Texas, which leads the nation in mercury emissions, will follow any stricter regulations than the federal government requires.

Differing Views

Jim Martin is the director of conservation for Pure Fishing, the largest manufacturer of fishing tackle in the world, and is the former chief of fisheries for the state of Oregon. Martin is among those who believed that the Bush administration would adopt the most stringent controls on mercury emissions, and he is both disappointed and outraged. "The administration would have to try very hard to find a plan that threatens fishing, and fisheries, more than this one," he says. "It is more than irresponsible. We are going to have to stand together and say, 'No, no, no, you cannot do this. This is just too much.'"

EPA spokeswoman Cynthia Bergman says the uproar is hard to understand. "People who say that this is weakening the Clean Air Act are wrong. There has never been a regulation on mercury before. Now we are making an effort to control it, and they are saying, 'It's not good enough.' Well, nothing we do is ever good enough, according to them."

Dr. Jane Hightower tries to remain outside of the politics of the issue. "The only organization I'm a member of is the American Medical Association," she says. But she admits to reservations about the Bush plan. "From what we are learning, I'm not sure it is fair for industry to be allowed to trade mercury emissions. People living outside some power plants will receive high levels of contamination, while others will be

protected, just because they happen to live somewhere else. That doesn't seem right."

All sources contacted for this story agree that advances in energy technology--and especially energy conservation and efficiency--would be the most practical and effective way to escape our dependence on coal. But our addiction runs long and deep.

In 1272, King Edward I of England proclaimed, "Be it known to all within the sound of my voice, whosoever shall be found guilty of burning coal shall suffer the loss of his head." One unlucky London coal burner was actually caught and executed. Clearly this isn't an option for limiting the amount of mercury getting into our fish. But just as unacceptable is any threat to our absolute right to take a healthy meal from our waters.

To read the full text of the new FDA-EPA advisory on the risks of methylmercury in fish, go to www.fda.gov/oc/opacom/mehgadvisory1011.html.

SOME TROUBLED WATERS

Mercury levels vary widely from species to species and from body of water to body of water. Also, although the EPA consumption guidelines are based on mercury contamination levels of .5 parts per million, states have differing thresholds before mercury advisories are issued. Some examples:

ALABAMA

On the Tombigbee River near the Olin Basin Superfund site, largemouth bass have been found with mercury levels as high as 1.3 ppm. Mercury found here was released by industry in the 1950s and '60s. The state has placed a "Do Not Eat" warning on fish from this part of the Tombigbee and five other creeks and rivers. Surveys of bass from other Alabama waters have found levels averaging .39 ppm, well below the danger zone.

ALASKA

Big northern pike randomly sampled from a tributary of the lower Yukon River were found with average mercury levels of 1.5 ppm. The toxin is believed to have come from naturally occurring deposits.

OREGON

Fish are screened at contaminant levels starting at .35 ppm. Largemouth and smallmouth bass in the state often show mercury levels of .5 ppm.

WISCONSIN

Ninety-three waters in Wisconsin have advisories more stringent than the state-wide mercury advisory. Mercury levels in muskies have been found to range from .1 to 1.9 ppm.

The only way to determine the levels of mercury (or other toxins) where you fish is to consult your state fishing agency for specific information. Go to <http://map1.epa.gov/scripts/.esrimap?name=Listing&Cmd=StContacts> for a list of websites at which you can read state-specific fish consumption advisories. --H.H.

THE MERCURY CYCLE: FROM COAL PLANT TO FISHERMAN

- (A) Coal-burning power plants emit mercury into atmosphere.
- (B) Precipitation brings mercury into water.
- (C) Microorganisms convert mercury to methylmercury.
- (D) Prey fish eat algae that has been contaminated.
- (E) Large fish consume prey fish. At this point, mercury could have accumulated to such a high level that it would pose a danger to humans who consume those fish.

MERCURY AND YOU

Dr. Jane Hightower's research showed that patients--many of whom had mercury levels 10 times the average and were experiencing a wide range of medical problems--reduced their levels significantly by cutting high-mercury-content fish from their diets.

If you are concerned about having elevated mercury levels, you can request a blood test from your physician. The cost should be around \$53.

Many experts say that hair samples more accurately determine long-term mercury exposure than do blood samples. One source from which your doctor can obtain a hair-testing kit is Great Smokies Diagnostic Laboratory, 800-522-4762; www.gsdl.com. --H.H