TRIBUNE INVESTIGATION THE MERCURY MENACE

Toxic risk on your plate

Seafood for sale in area stores is contaminated with mercury, Tribune testing shows. Government and industry fail to protect consumers, even as Americans buy more fish than ever.

Tribune photo by Chuck Berman

Delaney Dubow helps her mother, Rhonda, pick out canned tuna in Bolingbrook. The federal government has failed to adequately inform consumers that canned tuna might be risky for children because of mercury contamination.

By Sam Roe and Michael Hawthorne | Tribune staff reporters

Supermarkets throughout the Chicago area are routinely selling seafood highly contaminated with mercury, a toxic metal that can cause learning disabilities in children and neurological problems in adults, a Tribune investigation has found.

In one of the nation's most comprehensive studies of mercury in commercial fish, testing by the newspaper showed that a variety of popular seafood was so tainted that federal regulators could confiscate the fish for violating food safety rules.

The testing also showed that mercury is more pervasive in fish than what the government has told the public, making it difficult for consumers to avoid the problem, no matter where they shop.

It is not by happenstance that contaminated fish can be found on shelves and at seafood counters throughout the region, from small neighborhood shops on the South Side to sprawling supermarket chain stores in the northwest suburbs.

The Tribune's investigation reveals a decades-long pattern of the U.S. government knowingly allowing millions of Americans to eat seafood with unsafe levels of mercury.

Regulators have repeatedly downplayed the hazards, failed to take basic steps to protect public health and misled consumers about the true dangers, documents and interviews show.

The government does not seize high-mercury fish that violate U.S. limits. Regulators do not even inspect seafood for mercury—not in ports, processing plants or supermarkets.

In fact, federal officials have tested so few fish that they have only a limited idea of how much mercury many species contain, government data show. For example, the government has tested just four walleye and 24 shrimp samples since 1978. The newspaper tested more samples of commercial walleye than the government has in the last quarter-century.

The fishing industry also has failed consumers. The newspaper's investigation found that U.S. tuna companies often package and sell a high-mercury tuna species as canned light tuna—a product the government specifically recommends as a low-mercury choice.

The consequence is that eating canned tuna—one of the nation's most popular foods—is far more hazardous than what the government and industry have led consumers to believe.

Medical experts agree that, on balance, eating fish is good for most people. Seafood is a low-fat source of protein, and some fish are rich in omega-3 fatty acids, which are thought to help prevent heart disease.

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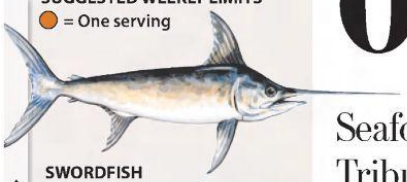
How much can you safely eat?

A typical serving is 6 ounces.

The Tribune bought fish at area stores and had it tested for mercury. Below are the amounts of various fish a 161-pound person* can eat per week before being exposed to potentially unsafe amounts of the toxic metal.

SUGGESTED WEEKLY LIMITS
● = One serving

HIGH MERCURY RISK ▲



SWORDFISH
1.3 oz. | ◔ About 1/4 serving

ORANGE ROUGHY
3.2 oz. | ◐ About 1/2

WALLEYE
3.5 oz. | ◐ About 1/2

YELLOWFIN (Tuna steak)
5.2 oz. | ◕ More than 3/4

ALBACORE (Canned tuna)
6.0 oz. | ● 1

GROUPER
6.9 oz. | ●◔ About 1

SKIPJACK (Canned light tuna)
16.4 oz. | ●●◕ About 2 3/4

SALMON
60.1 oz. | ●●●●●●●●●◔ About 10

◀ LOW MERCURY RISK

*The average weight of women ages 18-45 is 161 pounds; women who are or may become pregnant are advised to avoid some types of fish because of mercury.

Tribune illustrations by Rick Tuma

THE SERIES

SUNDAY
Popular supermarket fish are contaminated with high levels of the toxic metal mercury

MONDAY
For decades, the U.S. government has neglected the mercury problem

TUESDAY
Canned tuna is more hazardous than authorities have disclosed

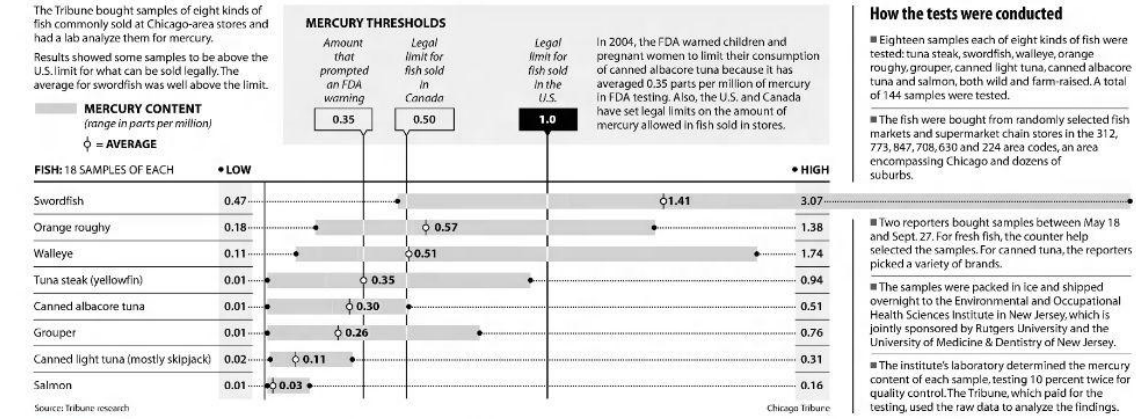
ON THE WEB

Calculate your mercury risk, view interactive graphics and more at **chicagotribune.com/mercury**

What the testing found

The Tribune bought samples of eight kinds of fish commonly sold at Chicago-area stores and had a lab analyze them for mercury.

Results showed some samples to be above the U.S. limit for what can be sold legally. The average for swordfish was well above the limit.



How the tests were conducted

- Eighteen samples each of eight kinds of fish were tested: tuna steak, swordfish, walleye, orange roughy, grouper, canned light tuna, canned albacore tuna and salmon, both wild and farm-raised. A total of 144 samples were tested.
- The fish were bought from randomly selected fish markets and supermarket chain stores in the 312, 773, 847, 708, 630 and 224 area codes, an area encompassing Chicago and dozens of suburbs.
- Two reporters bought samples between May 18 and Sept. 27. For fresh fish, the counter help selected the samples. For canned tuna, the reporters picked a variety of brands.
- The samples were packed in ice and shipped overnight to the Environmental and Occupational Health Sciences Institute in New Jersey, which is jointly sponsored by Rutgers University and the University of Medicine & Dentistry of New Jersey.
- The institute's laboratory determined the mercury content of each sample, testing 10 percent twice for quality control. The Tribune, which paid for the testing, used the raw data to analyze the findings.

Tainted fish found across region

MERCURY

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And Americans have responded to the idea that fish is healthy: Per capita seafood consumption hit an all-time high last year.

But for high-risk groups—young children, pregnant women, nursing mothers and women who could get pregnant—some fish might do more harm than good. Mercury can damage the central nervous system of children, causing subtle delays in walking and talking as well as decreased attention span and memory.

Adults can experience headaches, fatigue, numbness in the hands and feet, and a lack of concentration. Some studies suggest that men also face an increased risk of heart attacks.

No one knows how many people in the U.S. have been harmed by mercury in fish. But a recent government study estimated 410,000 babies are born each year at risk for mercury poisoning because of high levels in their mothers' bodies.

The Tribune's testing suggests that many people unknowingly are putting themselves at risk.

The newspaper randomly selected supermarket chain stores and fish markets in the Chicago area and bought 18 samples each of eight kinds of fish, including two types of canned tuna. The samples were sent for analysis to a laboratory at Rutgers University, which has performed some of the nation's only studies of mercury in store-bought seafood.

In the Tribune tests, some popular fish, such as swordfish, showed extremely high levels of mercury; other fish, such as salmon, had low amounts. Mercury levels varied widely in most kinds of fish tested, sometimes spiking far higher in individual samples than the averages reported by the government.

High levels also were found in two species for which the government has not issued consumer warnings: orange roughy and walleye.

Many of the walleye contained so much mercury that the country supplying it, Canada, could ban the fish from being sold within its borders because the contamination violated Canadian safety standards.

Some samples of grouper, tuna steak and canned tuna were so high in mercury that millions of American women would exceed the U.S. mercury exposure limit by eating just one 6-ounce meal in a week. This conclusion is based on applying a federal formula for the acceptable amount of mercury in the bloodstream to a 161-pound woman, the government's estimated average weight of a U.S. female of childbearing age.

UNCERTAINTIES POSE CHALLENGE FOR PUBLIC

The simple question "Is fish safe to eat?" depends on many factors. What kinds of fish do you eat? How much do you eat? How often do you eat it? How much do you weigh?

Avoiding mercury-contaminated fish is further complicated by the fact that the metal is ubiquitous in the world's oceans, lakes and rivers. So it likely does not matter who catches the seafood, processes it or sells it. In fact, many supermarket chains share the same suppliers.

With environmental groups and some state officials calling for mercury warnings in supermarkets, Jewel, Dominick's and other major chains have begun to post advisories. But these chains cannot tell shoppers how much mercury is in any particular piece of fish.

Shoppers have no way of knowing, for instance, if one piece of orange roughy in a supermarket display case has a widely different amount of mercury than the orange roughy fillet next to it. The same is true for canned tuna and many other kinds of fish.

No federal testing program exists for mercury, and scientists can provide only estimates of contamination based on limited sampling.

Tribune photo by Chuck Berman

Swordfish (left) and halibut have been identified as high mercury fish, but there is no federal testing to tell stores or shoppers how much mercury is in a particular piece of seafood.

Officials with the Food and Drug Administration, which is responsible for the safety of commercial seafood, told the Tribune that the agency has neither the time nor the money to routinely test fish. They also said the government's task of protecting consumers is complex.

"If fish were only bad, this would be easy," said David Acheson, the FDA's chief medical officer. "But fish have many benefits."

Last year, the FDA and the U.S. Environmental Protection Agency jointly issued an advisory that told pregnant women, young children and other at-risk groups not to eat shark, swordfish, king mackerel and tilefish because of high mercury levels. The warning also cautioned those groups to limit their overall fish consumption to 12 ounces a week, including no more than 6 ounces of canned albacore tuna.

The nation's overall food safety system has been repeatedly criticized for flawed inspections and limited enforcement. But several government studies have singled out the FDA for not doing enough to ensure fish is safe to eat.

The FDA, for instance, does not require exporting countries to maintain safety, sanitation and inspection programs comparable with the U.S. system, even though 80 percent of the seafood that Americans consume is imported. By contrast, the Department of Agriculture, which monitors meat and poultry, requires every exporter to meet such standards.

For its part, the seafood industry stresses the health benefits of eating fish. Industry representatives told the Tribune that tough mercury warnings would not encourage consumers to eat fish that are less contaminated. Instead, the industry fears such warnings would simply scare people away from seafood altogether.

"If you stop eating tuna, it's not like you start eating a salmon sandwich. No one does that," said John Stiker, who until recently was an executive vice president of Bumble Bee Seafoods, a leading canned tuna company. "They end up eating some other kind of sandwich. And I got to tell you, there's nothing good about ham for a pregnant mom and her baby. Nothing."

'I THOUGHT I WAS DOING MYSELF GOOD'

Almost all the mercury that people are exposed to comes from eating fish. And almost all fish contain some amounts of the metal, much of which falls into oceans, lakes and streams from air pollution.

- Some people are having dental fillings removed and replaced with mercury-free options. Q, SECTION 13

Some of that pollution can travel around the world before falling to the ground. So emissions from a factory in China can pollute a lake in America and vice versa. Mercury also occurs naturally in rock and soil and is continually being released into the oceans through erosion and underwater volcanoes.

In water, bacteria chemically alter mercury, creating a highly toxic form called methylmercury, which the tiniest fish eat or absorb. As bigger fish eat smaller fish, mercury accumulates up the food chain, with the largest predators, such as shark and swordfish, generally containing the most.

At the top of the food chain are people. And because mercury passes easily through the placenta and can harm the developing nervous system, fetuses and small children are most vulnerable to its effects.

Many experts now believe that even tuna-fish sandwiches—a favorite of the American diet—can be risky for children.

"The fact that we poisoned our air and our oceans to such an extent that we can't eat a damn tuna sandwich is just diabolical," said Ayelet Waldman, a noted mystery author whose daughter was diagnosed with mercury poisoning at age 5 after frequently eating tuna.

"You spend so much time as a parent making the world safe for your children," Waldman said. "We strap 75 different kinds of helmets on our kids, and here I was exposing [her to a] neurotoxin in the food I was giving her because I thought it was healthier."

Solving the mercury problem ultimately will require reducing levels of the pollutant in the environment, according to the National Academy of Sciences, the nation's leading scientific advisory body. For now, though, the academy says consumers can best protect themselves by eating low-mercury fish.

The importance of avoiding mercury-laden seafood was underscored by a study released this fall by researchers from Harvard Medical School.

Children born to women who ate fish during their pregnancies did better on tests of memory and visual recognition, the study found. But if mothers had high levels of mercury in their bodies—mercury absorbed from the fish they ate—their children posted lower scores than those whose mothers ate less-tainted fish.

Other studies suggest the heart benefits of eating fish might be offset by mercury. Though the American Heart Association recommends eating fish twice a week to "benefit heart health," two major European studies found that mercury exposure can increase the risk of fatal heart attacks in men.

Waldman, of Berkeley, Calif., said that when her daughter, Sophie, was 5, she seemed to stop learning. She had trouble sounding out words she had already learned. She forgot how to tie her shoes.

During a heavy metals screening in 2000, Sophie showed high mercury levels, her mother said. After Sophie's mother consulted with a San Francisco internist, Dr. Jane Hightower, one of Sophie's favorite meals was identified as the culprit: She was eating a tuna sandwich a week made with canned albacore. Further tests by Hightower confirmed high mercury levels in Sophie, the doctor said.

When Sophie quit eating tuna, she started learning again, her mother said. "She seemed to us like she was a different kid."

Mercury does not stay in the body forever, Hightower said. It takes six months to a year for the metal to leave a person's bloodstream.

Hightower is one of the few American physicians who have diagnosed and treated people with elevated mercury levels. After discovering

PLEASE SEE FOLLOWING PAGE

Mercury's effect on humans

An organic form of the metallic element mercury, called methylmercury, is found in nearly all fish and can lead to health problems in humans at high concentrations.

RELATED HEALTH PROBLEMS

- Exposure to mercury can damage the central nervous system (the brain and spinal cord) in fetuses and young children.
- Some scientists believe that increased exposure to mercury can raise the risk of heart attacks in men.

SYMPTOMS OF MERCURY POISONING

SMALL CHILDREN	ADULTS
Subtle decreases in learning abilities	Numbness in hands and feet
Delays in walking and talking	Headaches
Decreases in attention or memory	Fatigue
	Loss of concentration, coordination or memory
	Blurred vision
	Hair loss
	Nausea
	Tremors

PROGNOSIS

Mercury does not stay in the body forever. It takes about six months to a year to leave the bloodstream once exposure stops. Some researchers think mercury can permanently damage the nervous system in children.

Sources: U.S. Food and Drug Administration, U.S. Environmental Protection Agency, MedlinePlus, California Office of Environmental Health Hazard Assessment, Wisconsin Department of Natural Resources, Dr. Jane Hightower

Chicago Tribune

FIND MORE ONLINE

You can read the entire Chicago Tribune report at **chicagotribune.com/mercury**, plus...

CALCULATOR: Use the Tribune's online fish mercury calculator to determine if your favorite seafood is safe.

GRAPHIC: See how mercury gets to your dinner table.

VIDEO: Reporter Michael Hawthorne discusses the series.

PHOTO GALLERY: See where the fish we eat comes from.

SURVEY: Tell us about your fish-eating habits.

LIVE CHAT: Ask the reporters questions, 1 p.m. Tuesday.

About the reporters

Sam Roe has been an investigative reporter at the Tribune since 2000. He has written about the hazards of the metal beryllium, the nation's failed Supercar program and Islamic fundamentalism.

Michael Hawthorne has been the Tribune's environment reporter since 2004. He has written about the potential dangers of a chemical used to make Teflon, air pollution from coal-fired power plants and threats posed by invasive species.

Roe

Hawthorne

MERCURY

CONTINUED FROM PREVIOUS PAGE

that some of her patients had complaints suggesting mercury poisoning, such as headaches, fatigue and loss of concentration, she tested 123 children and adults who had symptoms or who reported eating fish.

In a peer-reviewed study published in 2003, Hightower reported that 89 percent of the patients showed high mercury levels in their blood.

Many of the patients, she said, were wealthy professionals who dined out frequently or ate fish as part of a workout regimen. Most, she said, were unaware of the risks.

"I was incredibly surprised," said Arnold Michael, 48, a videographer in Ft. Lauderdale who developed dizzy spells after eating tuna steaks and canned tuna at least four times a week. "I was just bingeing on it."

Tests showed he had high mercury levels, and he contacted Hightower for help. "I was eating fish," Michael said. "I thought I was doing myself good."

BANNED IN CANADA, SOLD IN AMERICA

Testing by the Tribune showed that a variety of fish that consumers might assume are relatively safe actually contain high levels of mercury.

For example, 15 of the orange roughy samples the Tribune bought had high levels.

The testing also indicates mercury levels can vary widely even within a given species. A sample of orange roughy from Dominick's in suburban Crestwood had seven times more mercury than a piece from Jewel on North Elston Avenue in Chicago.

Though some of the Tribune's results were in line with previous limited U.S. sampling, others represented the first thorough testing of certain fish in years.

The FDA has tested only four walleye samples since 1978, 14 fewer than the Tribune. The newspaper found that walleye averaged 0.51 parts of mercury per million parts of fish tissue.

That may sound like a tiny amount, but mercury is so toxic that, by one estimate, a teaspoon of the metal is enough to contaminate a small lake. The amount the Tribune found in walleye, which was imported from Canada, is above the limit at which Canadian officials can ban fish from sale within that country's borders.

Four of the walleye samples were even above the much weaker U.S. limit of 1 part per million.

In an interview earlier this year, Canadian officials said their own testing in Lake Erie, where almost all of the country's walleye exports originate, showed there was no reason for concern.

"Why should we spend resources looking for a problem we know doesn't exist?" said John Hoeve, a senior policy officer for the Canadian Food Inspection Agency.

When told later about the Tribune test results, Hoeve said he was surprised the newspaper found mercury levels in some Canadian walleye that exceeded the U.S. standard. "I fully expected fish over the Canadian limit, but I wouldn't have expected those kind of numbers," he said.

People buying fishing licenses are given mercury warnings for walleye and other freshwater fish, but the federal government does not require such advisories in American supermarkets—even if the fish comes from the same waters.

The nation's divided oversight of fish safety helps explain the discrepancy. State environmental agencies and the EPA oversee recreationally caught fish, while the FDA is responsible for commercial fish. And the FDA has not extensively tested fish or issued comprehensive mercury warnings.

Agency officials said not enough walleye is consumed nationwide to merit their attention, even though the fish is popular in the Midwest. "Walleye just isn't going to be high on our radar screens," Acheson said.

In the Tribune's testing, walleye and orange roughy averaged below the government's do-not-sell limit of 1 part per million, but still high enough that a 161-pound woman should eat no more than 3.2 ounces of orange roughy and 3.5 ounces of walleye in a week.

The FDA has issued warnings for canned albacore tuna, which has averaged 0.35 parts per million in the agency's testing. Yet the agency has not issued warnings for orange roughy, which averaged 0.57 parts per million in the Tribune testing, or walleye, which was at 0.51.

When the FDA issued its mercury warning last year—an advisory posted on its Web site but not required in stores—the agency did not include some fish it knew had high levels of the toxic metal. Officials said they wanted to keep the advice simple.

If consumers have concerns about mercury in a particular species of fish, Acheson said, they should go to the agency's Web site, www.cfsan.fda.gov/~frf/sea-mehg.html.

"The data is there if somebody wants to go look it up," he said.

Swordfish showed the highest mercury levels in the Tribune tests, averaging 1.41 parts per million, well above the 1.0 limit at which regulators can confiscate fish. In FDA testing, swordfish has averaged 0.97 parts per million.

FDA officials said it is impractical to test individual swordfish to weed out those that are heavily contaminated.

Issuing warnings is a better way to protect at-risk groups, such as young children and pregnant women, the officials said. "Rather than saying, 'You can eat swordfish as long as it has been tested,' we're saying, 'Don't eat those fish,' " Acheson said.

Though it is unclear whether a single high-mercury meal could harm a fetus, experts say the developing nervous system is so sensitive to toxic substances that caution should prevail. "You only get one chance to develop a brain," Hightower said.

Waldman, Sophie's mother, said that if there had been proper warnings years ago, she never would have fed so much canned tuna to her daughter, now 11. Today, Waldman said, she keeps track of how much fish her daughter eats and consults an environmental group's Web site to find mercury levels in various fish.

Deborah Rice, a former EPA toxicologist and mercury expert, said that most consumers cannot be expected to research the mercury levels of their favorite fish and "then keep a diary about when was the last time they ate orange roughy."

"But that's what it has come down to."

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Photo for the Tribune by John Lee

Author Ayelet Waldman says her daughter was diagnosed with mercury poisoning at age 5. One of the girl's favorite meals was deemed the culprit: tuna sandwiches made with canned albacore.

How to minimize risks of mercury

A lack of government guidance makes it difficult to avoid mercury in seafood. But consumers can take steps to reduce the likelihood of eating tainted fish.

While it makes no difference where you shop—supermarkets, health food stores and gourmet fish shops often use the same suppliers—consumers can choose to buy certain kinds of seafood.

Small or short-lived species, such as sardines, shrimp, crab and tilapia, generally have low amounts of mercury. Wild salmon, which eat plankton and small fish, are low in mercury, as are farm-raised salmon, which are fed fish meal containing little mercury.

Large predator fish, such as swordfish and shark, generally have the most mercury.

Regulators report that fish sticks and fast-food fish sandwiches, which typically are made with pollock, are low in mercury. But scientists say more tests are needed to confirm that.

Cooking does not remove mercury from fish because the metal is bound to the meat. For example, a piece of tuna will have the same amount of mercury whether it is eaten raw as sushi or cooked on the grill.

Although some mercury is present in all bodies of water, the nation's drinking water generally is not considered a mercury hazard; federal law requires drinking water be tested and treated to remove the toxic metal.

For consumers shopping for fish, money offers no protection against mercury exposure. Rutgers University scientist Joanna Burger recently compared fish bought at stores in wealthy New Jersey areas with those bought in poor ones. She found no differences in mercury levels.

"They were mainly getting their fish from the same source," said Burger, whose staff also conducted the mercury analysis for the Tribune investigation.

Whole Foods Market, which bills itself as the world's leading retailer of natural foods, said its seafood likely has as much mercury as fish sold elsewhere. "It's a global problem," said spokeswoman Ashley Hawkins.

The area's major grocery chains, Dominick's and Jewel, said they have received no complaints about mercury.

People concerned about exposure to mercury because of the fish they eat should consult a doctor. Blood and hair tests can determine a person's mercury levels.

Sam Roe and Michael Hawthorne