



Mercury and Fish



Fish is a good source of protein, vitamins, minerals, and fatty acids. Most fish that people eat contains some mercury. Mercury is not a necessary part of the diet for humans. In large amounts taken in all at once, mercury can cause severe health problems. Mercury can also cause health problems if a small excess is ingested over a long period. The Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) released joint [guidelines](#) to help people decide how much fish they can safely eat to get nutritional benefits while avoiding excess amounts of mercury. This fact sheet provides further information about mercury and fish.

What is mercury?

Mercury is a metallic element that occurs in three forms in the environment: elemental, inorganic, and organic. Most people have seen elemental mercury in thermometers and blood pressure gauges. In this form, mercury is a shiny, silver-colored, metallic liquid. Mercury also takes inorganic and organic forms. Soils and rocks contain small amounts of inorganic mercury. Bacteria transform inorganic mercury into organic mercury (also known as methyl mercury). Exposure to all forms of mercury can cause health problems. Fish may contain excess amounts of organic mercury.

Where does organic mercury come from?



Bacteria found in water and soil turn inorganic mercury that has been released into the atmosphere into organic mercury (also called methyl mercury). Volcanic activity and the break down of rocks and soils release inorganic mercury into the atmosphere. Inorganic mercury also enters the atmosphere as a result of human activity. Coal burning power plants, paint and paper manufacturing, city and hospital waste incinerators, and improper battery and light bulb disposal all add mercury to the environment. Mercury is also used in dental fillings, preservatives, medicines, cosmetics, fungicides, and pesticides. Human activity has caused a two to three fold increase in mercury levels in the atmosphere in the past 150 years. When the amount of inorganic mercury in the atmosphere increases then the amount of organic mercury made by bacteria also increases.

Why do fish have high amounts of methyl mercury?

Industrial use of mercury has caused inorganic mercury levels in the atmosphere to increase. This has increased mercury levels in oceans, rivers and lakes. Bacteria living in the water have more inorganic mercury available and create more methyl mercury. Plants and small animals that live in the water ingest methyl mercury. Fish that eat these plants and small animals begin to accumulate mercury in their bodies. Larger fish that eat the small fish also accumulate mercury. When humans eat too many fish that have accumulated large amounts of mercury they can also accumulate excess mercury in their bodies and develop health problems.

What are the health effects of methyl mercury accumulation?

People are able to get rid of small amounts of methyl mercury that they may ingest. However, when people eat more mercury than they are able to get rid of, it starts to accumulate in their bodies. Accumulation of excess methyl mercury can lead to permanent nerve and brain damage. Nerve and brain damage can cause personality changes, hearing and vision problems, trouble with balance, coordination and muscle movement, and memory and thinking problems. Methyl mercury is thought to be more dangerous for children and developing fetuses than adults. The exact level at which methyl mercury starts to accumulate and becomes harmful is still uncertain.

Which fish have the most and least mercury?

Fish that are older, larger, and higher on the food chain such as tilefish, swordfish, king mackerel, fresh and frozen tuna, and shark generally have the highest concentration of methyl mercury. Fish that have the least mercury are salmon, flounder, pollack, and catfish. FDA has produced a [list](#) of commercial fish along with their mercury levels. Information about the levels of mercury in sport fish varies by location. It is important to be aware of fish advisories that may contain warnings of excess mercury in fish caught in local waters. Remote wilderness lakes and streams can sometimes have high levels of mercury, even though they appear to be clean. The California State Office of Health Hazard Assessment has issued fish advisories for the [San Francisco Bay](#) and the rest of [California](#).

What are the recommendations of the FDA and EPA?

The EPA and FDA have issued joint guidelines that set limits on how much fish **pregnant women, nursing mothers, women of child-bearing age, and children** should eat. The goal of these guidelines is to avoid the accumulation of mercury by setting a limit on the amount of mercury that is safe to eat. These guidelines attempt to balance the positive effects of fish consumption with the harmful effects of methyl mercury:

Avoid entirely

- Tilefish
- Swordfish
- King mackerel
- Shark

No more than 6 ounces per week

- Albacore or white tuna

No more than 12 ounces per week

- Shrimp
- Canned light tuna
- Salmon
- Pollock
- Catfish
- Other low mercury fish

What are the benefits of eating fish?

Fish are high in protein, low in saturated fat, contain essential minerals, vitamins, and fatty acids, and should be included in a balanced diet. Consumption of fish is thought to lower the risks of heart disease. Fatty acids found in fish are important for building healthy nerve cells. It is not necessary to stop eating all fish to keep mercury intakes low.

Further information

[Agency for Toxic Substances and Disease Registry](#)

EPA [Locally caught fish](#)

EPA [Mercury in the environment](#)

[Mercury Policy Project](#)

[National Academies Press Report: Toxicological Effects of Mercury](#)

[U.S. Geological Survey](#)

Guidelines set by other countries and the World Health Organization

The table below shows fish and methyl mercury guidelines developed by other countries and WHO. All of these agencies recommend limited fish intake as part of a balanced diet.

Comparison of recommended fish allowances from U.S., Canada, Australia/New Zealand, U.K., and WHO

Source	Population	Fish	Recommended fish intake	Recommended mercury intake limits
U.S. FDA – EPA	• General population	None specified	None specified	0.1 µg mercury per kg body weight per day
	• Pregnant women • Nursing mothers • Women of child-bearing age • Children	• Swordfish, king mackerel, shark, tilefish • Other fish • Albacore tuna • Sport fish	• Avoid • 12 oz per week • 6 oz per week • Check local fish advisories	
Health Canada	• General population	• Shark, swordfish, fresh and frozen tuna	• One meal per week	None
	• Pregnant women • Women of child-bearing age • Young children		• One meal per month	
Food Standards Australia New Zealand	• General population	• Shark, swordfish • All others	• 1 meal (6 oz) per week • 2 - 3 meals per week	0.5 µg mercury per kg body weight per day
	• Pregnant women • Women of child-bearing age • Children	• Shark, swordfish • Catfish, orange roughy • All others	• 1 meal per two weeks • 1 meal per week • 2 - 3 meals per week	0.2 µg mercury per kg body weight per day
U.K. Food Standards Agency	• General population • Nursing mothers	• Shark, swordfish, marlin	• 1 meal (5 oz) per week	0.5 µg mercury per kg body weight per day
	• Pregnant women • Women of child-bearing age • Children	• Shark, swordfish, marlin • Tuna	• Avoid • 2 meals per week	0.2 µg mercury per kg body weight per day
World Health Organization	• General population	None specified	None specified	0.2 µg mercury per kg body weight per day