MERCURY and the Fish We Eat

Should I Be Concerned?

80
Hg
MERCURY
200.59

What is mercury? Mercury is a naturally occurring metal that is present throughout the environment in low concentrations. Mercury is generally present in the environment as either inorganic mercury or as organic methylmercury. Inorganic mercury comes in three forms: elemental, mercuric, and mercurous.

The problem with fish: methylmercury

Methylmercury is the type of mercury found in fish and is much more dangerous to human health than inorganic mercury. Methylmercury can be absorbed into the body six times faster than inorganic mercury, and it is taken into the part of the fish that people usually eat — the muscle tissue. This means that methylmercury is more bioavailable than other forms of mercury. Because of this high bioavailability, methylmercury can account for more than 95% of the mercury in fish tissue.

What is methylmercury? How is it created?

Inorganic mercury in the environment is taken in and changed by living things such as soil bacteria through a process called methylation. Methylation happens when carbon and hydrogen are added to mercury, transforming the compound into methylmercury (abbreviated CH3Hg).

Methylation can happen in water, sediment, or soil, but the rate of change to methylmercury depends on environmental conditions. Methylation is affected by the types of bacteria in the soil, the amount of oxygen in the soil, and soil conditions overall.

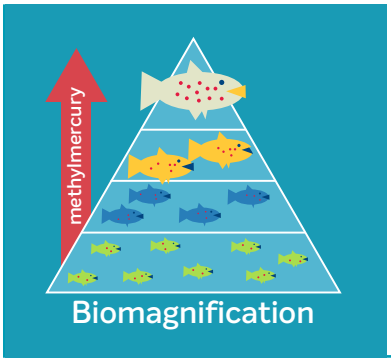
Where does mercury in fish come from?

66%
HUMAN-MADE SOURCES

Worldwide, 66% of mercury in the environment comes from human-made sources, mostly released to air and water.

Energy	coal-fired power plants
Mining	ore deposits containing mercury
Other Industry	manufacturing: batteries, cfl lights, waste
Historical Uses	thermometers, pesticides, signs, electronics

Photo credit: (l) epa.gov; (r) usgs.gov



Methylmercury in the food web: from fish to people

Methylmercury is absorbed by fish when contaminated water passes through their gills or when they eat a contaminated food source.

Methylmercury is persistent, meaning it is slowly removed from the body, and will build up in individual fish or people. This process is called **bioaccumulation**.

As prey fish are eaten by larger predator fish, and eventually by humans, the methylmercury can greatly increase up the food chain. This process is called **biomagnification**.

STOP CHECK Enjoy

Follow this link for current fish consumption advisories: http://bit.ly/eatsafefish

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early life exposures, later life consequences

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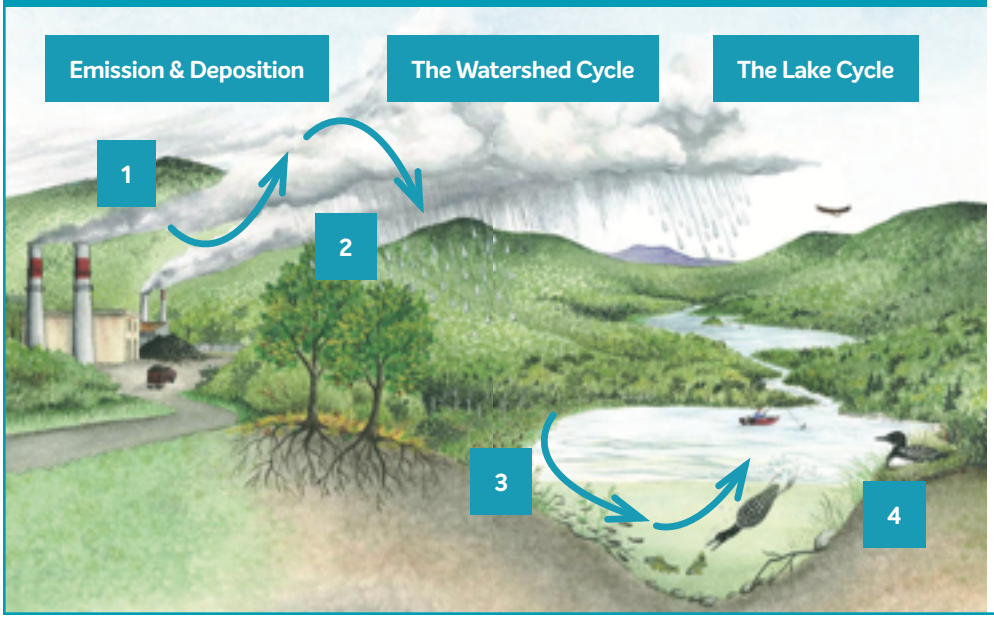
How does methylmercury get into fish and into us?



1 Mercury is emitted into the air from coal-fired power plants or other industrial sources.

2 Mercury from the emissions are deposited with rain, snow, or as gases and particles.

3 Mercury moves through watersheds and in soil and water it is converted to methylmercury.

4 Methylmercury bioaccumulates in food webs and then in people.

Image modified from: Driscoll, C.T., D. Evers, K.F. Lambert, N. Kamman, T. Holsen, Y-J. Han, C. Chen, W. Goodale,T. Butler, T. Clair, and R. Munson. Mercury Matters: Linking Mercury Science with Public Policy in the Northeastern United States. Hubbard Brook Research Foundation. 2007. Science Links Publication.

How can methylmercury affect my health?

Eating certain fish is a source of low doses of mercury for extended periods of time. These low-level, chronic exposures have been shown to affect the nervous system and muscle coordination.

Children and pregnant women are the populations of greatest concern for mercury exposure. Mercury exposure in pregnant women may damage a developing fetus by passing through the placenta barrier to the fetus. The brain and nervous system of a developing fetus or a young child is more susceptible to damage than adults.

What is a serving?

Image credit: fda.gov

For an adult
4 ounces

For children, ages 4-7
2 ounces

Are there regulations for mercury in fish?

Yes, fish consumption advisories are set to help people make informed decisions about eating local fish. Fish provide many dietary benefits as a source of lean protein, omega-3 fatty acids, and essential nutrients, but fish are also the main source of mercury exposure for most people. In North Carolina, there is a statewide advisory for mercury. Women of childbearing age (age 15-44), pregnant women, nursing women, and children under 15 should not eat fish high in mercury, including largemouth bass. Check your local advisory for more information - see below.

Where can I get more information?

- **North Carolina Department of Health and Human Services:** epi.publichealth.nc.gov/oee/fish/advisories.html
  Fish Consumption advisories for the State of North Carolina
- **Duke University Superfund Research Center Community Engagement Core:** What's in my fish?
- **UNC-Chapel Hill Superfund Research Program:** eatfishwisely.org
  Guide to Eating Locally-Caught Fish in the Triangle
- **NCSU Center for Human Health & the Environment:** appliedecology.cals.ncsu.edu/fish-consumption/ What You Need to Know about Eating Freshwater Fish in NC: Fish Consumption Advisories

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About the Duke University Superfund Research Center:
We study early life, low-dose exposures to environmental chemicals and effects on human development that might emerge later in life. We connect with government agencies, industry professionals, community organizations, and others to bring research and useful information about environmental health and chemical exposures to the public.

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Cited references available on request