



# Mercury and the fish we eat:

## Should I Be Concerned?

### 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*

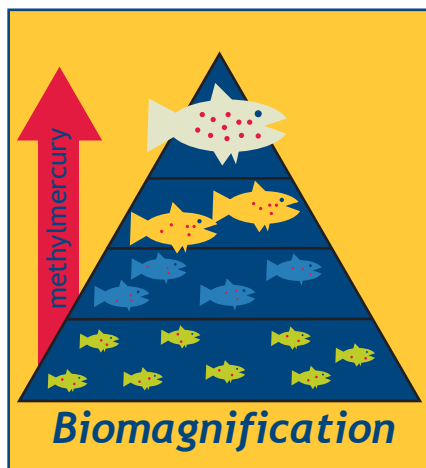
Methylmercury is the type of mercury found in fish and is much more dangerous to human health than inorganic mercury. Methylmercury can be absorbed into the body six times faster than inorganic mercury, and is taken into the part of the fish that people usually eat - the muscle tissue. This means that 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  $\text{CH}_3\text{Hg}$ ).

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.

### 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*.

### Where does Mercury in Fish Come From?



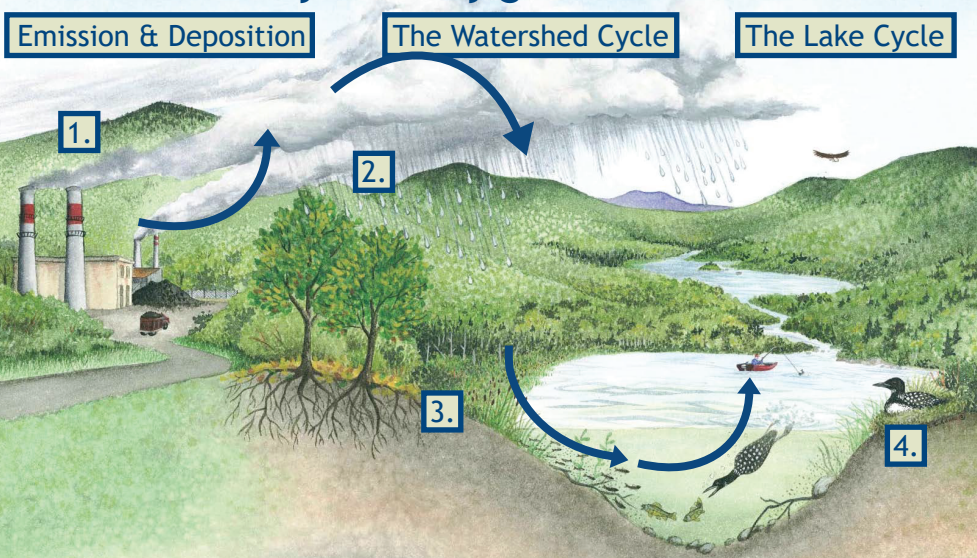
Worldwide, 66% of mercury in the environment comes from human-made sources, mostly released to air and water.

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

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

# Mercury and the Fish We Eat - Duke Superfund Research Center

## 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.

## 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.

### What is a Serving?



## Where Can I Get More Information?

- NC Dept. of Health and Human Services: <http://epi.publichealth.nc.gov/oe/fish/advisories.html>  
*Fish Consumption advisories for the State of North Carolina*
- UNC-Chapel Hill Superfund Research Program: <http://eatfishwisely.org>  
*Guide to Eating Locally-Caught Fish in the Triangle*
- NCSU Ctr. for Human Health & the Environment: [appliedecology.cals.ncsu.edu/fish-consumption/](http://appliedecology.cals.ncsu.edu/fish-consumption/)  
*What You Need to Know about Eating Freshwater Fish in NC: Fish Consumption Advisories*

**About the Duke 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, K-12 teachers, and others to bring research and useful information about environmental health and chemical exposures to the public.

*Cited References Available on Request*