The Health Effects from Eating Contaminated Fish

Questions and Answers on Selected Topics

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Health Effects Answers

How do methyl mercury, selenium, dioxin and PCBs affect human health?

The levels of these compounds found in West Virginia fish are not known to cause immediate severe sickness. Long-lasting contaminants such as PCBs, dioxin, selenium and mercury can build up in your body over time. It may take months or years of regularly eating contaminated fish to build up amounts that are a health concern. Health problems that may result from the contaminants in fish range from small, hard to detect health changes to birth defects, as well as mental and physical retardation in newborns. Mothers who eat highly contaminated fish for many years before becoming pregnant may have children who are slower to develop and learn. Therefore, women who plan to become pregnant should follow the fish consumption advice given to pregnant and nursing women for several years before becoming pregnant. It takes up to six years or more for the body to get rid of PCBs, and up to one year to get rid of mercury. The advisories that protect sensitive populations also protect all other members of the general public.

How do I reduce health risk?

- Eat smaller fish (within the legal-size limit). As a general rule, larger, older fish may be more contaminated than smaller, younger fish.
- Vary the kind of fish you eat. Trout and sunfish, such as bluegill eat insects and other aquatic life that are less likely to contain high levels of contaminants. Top predators like bass and walleye may have higher levels of contaminants. If you eat these species, eat the smaller fish to minimize your exposure.
- Choose leaner fish. Fish that are higher in fat –like channel catfish and carp – may have higher levels of PCBs and other chemicals in their body fat. Yellow perch, sunfish, and crappie are examples of lean fish.
- Clean and cook fish properly. How you clean and cook fish can reduce the level of contaminants by as much as half in some fish. Some contaminants concentrate in the fatty tissues and internal organs of fish. Filleting the fish, removing the skin and internal organs, and trimming the fat along the back, side, and belly of the fish helps reduce the contaminants. While cooking does not destroy contaminants, heat from cooking melts some of the fat in fish and allows some of the contaminated fat to drain away. Broil, grill, or bake the trimmed, skinned fish on a rack so that the fat drips away. Deep-fat frying removes some of the contaminants, but you should discard the oil after you cook the fish. Pan frying does not remove much of the contaminants. Mercury levels cannot be reduced by trimming because mercury binds to protein (the meat portion) of the fish.
What groups are most sensitive to contaminants?

Contaminants in fish can be harmful to many people of all ages, but the fetus and young children are especially sensitive to contaminants because their organs and systems are not yet fully developed. They are less able than an adult is to deal with toxic substances. Contaminants in fish can affect your baby more than they affect you and can be hard to detect. It is best to prevent childhood exposure to fish contaminants in the first place. In summary, the most sensitive groups are unborn children and children age six and under. This advice also includes women who plan to become pregnant, women who are pregnant and nursing mothers.

What contaminants are in fish?

The contaminants responsible for the advisories within West Virginia are methyl mercury, PCBs, selenium and dioxin. Other chemicals found in fish tissue have not been at levels where a fish advisory is needed to protect the public’s health.

What is Mercury?

Mercury is a naturally occurring metal found in the environment. Various compounds of mercury have been used in medicine and industry. Although medicinal uses have been discontinued, industrial uses of mercury continue.

How did mercury get into the West Virginia environment?

Because mercury is naturally occurring in the earth’s crust, natural land erosion may contribute to releases of mercury into the environment. Inorganic mercury may enter the air through burning of fossil fuels, mining, and waste or industrial emissions. Mercury released into the air can travel long distances and be deposited on soil and in waterbodies.

How does mercury get into fish?

In water bodies, small organisms convert inorganic mercury to the organic form, methyl mercury. Methyl mercury enters the aquatic food chain by binding with particles and sediment eaten by fish. Large fish may prey on smaller mercury-contaminated fish resulting in stored amounts of mercury in commonly caught fish. Fish eliminate mercury at a very slow rate; therefore, mercury tends to accumulate in their tissues and organs.

Is mercury found in every type of fish?

Mercury has been detected in most fish species sampled from waterbodies in West Virginia and other states. However, the range is quite broad and varies by water body and by species of fish.

Should I be concerned about exposure to mercury from eating fish?

People who consume moderate amounts of fish in a varied diet typically are not at risk of exposure to high levels of mercury. However, mercury may cause damage to the nervous system of an unborn child. Pregnant women who have high amounts of mercury in their body pass some
directly to the fetus. Because the effect mercury has on the nervous system is so well documented and because the developing fetus is highly sensitive, the West Virginia Bureau for Public Health recommends that pregnant women, women of childbearing age, nursing mothers, and children to follow both the West Virginia sport fish advisory recommendations and the EPAs and FDA recommendation on restaurant and grocery-acquired fish. The EPA and UFDA advisory follows.

Have fish in all West Virginia water bodies been tested for mercury?

No. In order to determine levels of contaminants biologists sample fish populations and collect fish tissue for laboratory analysis. Recent analysis of fish tissue data for West Virginia streams indicate that mercury has accumulated in some fish in many streams and lakes in West Virginia.

Should I be concerned about being exposed to mercury through swimming or other recreational activities in rivers, streams or lakes?

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The FDA and USEPA recently issued advice that recommends that women and children eat two to three servings (8-12 ounces for adults and children over age 10, smaller amounts for younger children) of a variety of fish and shellfish each week. The advice includes a chart showing how often to eat more than 60 types of fish and shellfish and supplemental questions and answers.

- Complete Advice (Chart plus Questions and Answers)
  - English (PDF) (8 pp, 203 K)
  - Español (PDF) (8 pp, 376 K)
  - Additional languages coming soon!
- Chart only (English | Español) (additional languages coming soon!)
- Press Release (January 18, 2017)

Federal Register Notice (January 19, 2017)
What are polychlorinated biphenyls (PCBs)?

PCB is an abbreviation for polychlorinated biphenyls. PCBs have good insulating and flame retardant properties and were widely used as coolants and lubricators in transformers, capacitors, and other electrical equipment. Manufacture of PCBs was halted in the US in 1979 based on evidence that these compounds can be concentrated in the environment and become a health hazard for humans. Although PCBs are no longer manufactured, many old electrical transformers and capacitors still contain them.

Experiments with animals have demonstrated that PCBs can produce adverse health effects such as liver damage, skin irritation, reproductive and developmental effects, and cancer. It is prudent to assume that PCBs pose health hazards for humans as well.

PCBs are widespread and persistent in the environment. Consuming contaminated fish can be a major exposure route for humans. Fish can accumulate PCBs through contaminated water, sediment, and prey. PCBs tend to accumulate in the non-edible portions of fish and in the fat.

What is dioxin?

The term "dioxin" refers to a group of chemicals that share certain similar chemical structures. This term is also used for the most well-studied and most toxic of these compounds: 2,3,7,8-tetrachlorodibenzo-p-dioxin, or TCDD for short. Dioxins are not created intentionally, but are a byproduct of human activities. Combustion, chlorine bleaching of pulp and paper, some types of chemical manufacturing and processing, and other industrial processes can create dioxin. For additional information concerning dioxin issues, contact the United States Environmental Protection Agency (USEPA) at www.epa.gov or contact one of the state agencies.

What is dioxin used for?

Dioxins are unwanted byproducts of human activities. Minute quantities are found in smoke and ash from motor vehicles, municipal incinerators and wood fire. A September 1999 US EPA fact sheet lists pulp and paper bleaching processes and production of some chlorinated phenols as sources. The most common source of dioxin currently results from incineration. Dioxins have been found in soil, surface water, sediment, plants, and animal tissue throughout the earth.

Where did the dioxin come from?

Past industrial activities in the lower Kanawha Valley, especially near the city of Nitro, West Virginia, have resulted in several dioxin-contaminated sites. The dioxin likely originated with the production of industrial solvents and the herbicide 2,4,5-T at facilities in and around Nitro. Disposal practices earlier in the 20th century --including burial of drums, dumping of dioxin-contaminated liquid wastes, and incineration of dioxin-contaminated material -- spread dioxin throughout the Nitro area. Areas downstream of Nitro likely became contaminated through the release and transport of dioxin into the Kanawha River and its tributaries. The Kanawha River and two of its tributaries, the Pocatalico River and Armour Creek, have been the focus of a total
maximum daily load (TMDL) study and preliminary federal Superfund investigations to determine the location and extent of the dioxin sources. Sampling for dioxin is continuing at several known and suspected contaminated sites in the Nitro area.

**How do people become exposed to dioxin?**

Dioxin accumulates in animal fat and tends to become concentrated in these tissues. Dietary intake is the most common source of exposure to dioxin for the general population. Meat, dairy products, fish, and other seafood contribute greater than 90 percent of intake for the general population. People who consume large quantities of freshwater fish and meats, dairy, and poultry products could have higher dioxin exposure.

**Where can I learn more about dioxin?**

Informational website:

[**EPA Dioxin**](http://www.epa.gov/dioxin/)

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**What's being done about dioxin contamination?**

The US EPA continues to assess the extent and magnitude of dioxin contamination in the Nitro area. In March 2004, USEPA entered into an administrative order to conduct an Engineering Evaluation/Cost Analysis to study dioxin-contaminated sediment in the Kanawha River. The purpose of this is to evaluate response alternatives that would protect public health, welfare, and the environment and to provide sufficient information for USEPA to determine the necessity, feasibility, and effectiveness of particular non-time critical removal actions. This effort is coordinating with the sport fish advisory committee in the development of a fish consumption survey and additional fish sampling.

**What is selenium?**

Selenium is a naturally occurring mineral element that is distributed widely in nature in most rocks and soils, particularly in the western and southwestern United States.

**What are the sources and uses of selenium?**

Most processed selenium is used in the electronics and glass industries. Selenium is a component of pigments in plastics, paints, enamels, inks, and rubber. Selenium is used in the preparation of pharmaceuticals, pesticides, and rubber. Selenium is an ingredient in some anti-dandruff shampoos. Selenium can be released into the environment during combustion of fossil fuels, and when metals are smelted. It is present in leachate from coal fly ash disposal areas. In West Virginia selenium has been found downstream of large-scale earth disturbance activities. Selenium also enters the environment when rocks weather.
What are the health effects of selenium?

Selenium is an essential nutrient but is toxic to both humans and animals at high concentrations. Selenium is used as a nutritional supplement for humans and animals. Long-term adverse effects from ingestion by humans have not been studied thoroughly. Selenium has the ability to bioaccumulate in aquatic food chains and may thereby contaminate the diet and induce reproductive effects in fish and birds. EPA has determined that one specific form of selenium, selenium sulfide, is a probable human carcinogen. However, selenium sulfide is not present in foods or the environment.

Where can I learn more about selenium?

Informational websites:

- Agency for Toxic Substances and Disease Registry (ATSDR)
- Aquatic Life Criterion - Selenium

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What are future sampling plans?

Fish contamination is a measure of environmental health as well as a potential source of human illness. BPH, DNR, and DEP are striving to improve the understanding of fish contamination throughout West Virginia. In 2001, DEP secured a grant from the USEPA to conduct a two-year statewide evaluation of fish for PCB and mercury contaminants. The DEP, DNR, BPH and the West Virginia University/US Geological Cooperative Fish and Wildlife Research Unit conducted this research. The study was finalized in 2004 and supplied the basis for the 2005 Fish Consumption Advisories. In recent years, fish tissue analysis has been conducted annually – collecting fish from targeted sites on a 5-year rotation. This approach allows the agencies to spread the financial and personnel costs across years while still providing the needed data to develop sound fish consumption advice. In 2016 and 2017, DEP utilized USEPA grant money to support a rigorous fish tissue evaluation of the Kanawha and Monongahela rivers with samples analyzed for mercury and PCBs, as well as dioxin at most Kanawha River sites.

What can I do if I am concerned about past fish consumption habits?

You should discuss any health concerns with your health care provider. The Bureau for Public Health can provide additional information.