

About Chemicals and Bacteria in Fish and Additional Information

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Information on Chemicals in Sportfish and Game

Most of what we know about the potential health effects of these chemicals comes from high-dose laboratory animal studies or in people exposed by accidents or in the workplace. Chemicals that cause health effects in laboratory animals and people after high level exposures may also increase the risk of effects in people exposed to lower levels for long periods of time.

PCBs

PCBs (polychlorinated biphenyls) are a mixture of man-made chemicals that were used in many commercial and electrical products until their manufacture was banned in the mid-1970s. PCBs are persistent in the environment and accumulate in the fat of fish and other animals. Thus, PCBs still remain a fish and game contaminant.

Health Concerns

Studies of women and their children show a link between elevated levels of PCBs in their bodies and slight effects on their children's birth weight, short-term memory and learning ability. A study of older adults (49-86 years old) who ate fish containing PCBs suggests that higher PCB exposure is associated with decreased memory and learning. Other studies have suggested a link between increased PCB exposure and effects on the human reproductive system, including changes in sperm quality, time to pregnancy and menstrual cycles. These studies suggest that the effects were caused by PCBs, but other factors may have played a role too. Some PCBs have been shown to cause cancer in laboratory animals exposed to high levels of the chemical throughout their lifetime. Studies of workers exposed to PCBs raise concerns that these chemicals can cause cancer in people, but the information is not adequate to prove that this is the case.

Polyfluoroalkyl substances

PFAS (per- and polyfluoroalkyl substances, previously referred to as PFCs) are chemicals that are used for fire-fighting foams, non-stick materials manufacturing, and many other applications. They are persistent in the environment and can accumulate in living things including fish. One of these PFAS, perfluorooctane sulfonate or PFOS, tends to accumulate in fish more than the other PFAS.

Health Concerns

Much of the available information on the toxicity of PFAS comes from studies of two PFAS (PFOS and perfluorooctanoic acid or PFOA), which are among the most widely used and environmentally persistent PFAS. PFOS tends to accumulate in fish more than the other PFAS. Animal studies show that high oral doses of PFOS can affect the liver and immune system, change cholesterol and hormone levels, and cause developmental effects. Scientists are not yet certain about the possible health effects in humans from exposure to PFAS. Human studies show associations between PFOS exposure and health effects similar to those seen in animals, such as immune system effects, reproductive and developmental effects, and changes in cholesterol levels. One long-term study showed that daily dietary doses of PFOS caused tumors in rats, but human studies are inadequate to make conclusions on the potential for PFOS to cause cancer in humans.

Mercury

Mercury is a metal that occurs naturally in the environment and can also get into the environment from human activity. Most of the mercury that accumulates in fish is an organic form called methylmercury. Fish that live longer and eat other fish tend to have more methylmercury than do smaller fish.

Health Concerns

Methylmercury can cause effects on the nervous system. Exposure to methylmercury is more of a concern for children and unborn babies because their nervous systems are still developing. People who ate fish that contained large amounts of methylmercury had permanent damage to the brain, kidneys and fetus. Some research on populations that eat a large amount of fish finds that methylmercury can affect children's memory, attention and language development. Other research on a different population that also eats large amounts of fish has not found such effects.

Chlordane, DDT, Dieldrin and Mirex

Chlordane, DDT, dieldrin and mirex are all man-made organochlorine chemicals that were once used as insecticides. Mirex was also used as a flame retardant in a number of materials. Although these chemicals have been banned in the United States since the 1970s (with the exception that chlordane and dieldrin, which were allowed for termite control until the 1980s), they are very persistent in the environment and accumulate in the fat of fish and other animals. Thus, these chemicals can still be found as fish and game contaminants.

Health Concerns

Chlordane, DDT, dieldrin and mirex can cause effects on the nervous system and the liver in laboratory animals. Chlordane, DDT and dieldrin have also caused effects on the nervous system of people. Some of these chemicals can also cause effects on the kidneys, the thyroid gland and on reproduction in animals and people. The levels of exposure that caused these effects are typically much higher than would likely occur from eating fish containing these chemicals. Chlordane, DDT, dieldrin and mirex also caused cancer in laboratory animals exposed to high levels over their lifetimes. Whether these chemicals cause cancer in people is not known.

Dioxins and Furans

Dioxins (polychlorinated dibenzo-p-dioxins or PCDDs) and furans (polychlorinated dibenzofurans or PCDFs) are two closely related families of chemicals. Some dioxins and furans are unwanted byproducts of manufacturing and also come from the smoke or ash of motor vehicles, municipal waste incinerators, wood fires and trash burning. Dioxins and furans are very persistent in the environment and accumulate in the fat of fish and other animals. Thus, these chemicals are fish contaminants.

Health Concerns

Most of what we know about dioxins and furans come from one particular dioxin, but many of these chemicals are likely to cause similar health effects. Dioxins and furans have been associated with causing skin effects as well as changes in reproductive hormone levels and indicators of liver function in people. Weaker evidence suggests that these chemicals can also cause a number of other health effects in people. Such effects include an association between a mother's exposure and effects on her child's nervous system, hormone levels and immune system. Some dioxins have been shown to cause cancer in laboratory animals exposed to high levels of the chemicals throughout their lifetime. The available human studies provide strong evidence of an association between exposure to one dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) and cancer.

Cadmium

Cadmium is a naturally-occurring metal found in small amounts in soil and water. Cadmium is used in many industrial operations and in consumer products such as paints, plastics and batteries. Cadmium also occurs in foods (especially fruits, vegetables and cereals) and tobacco. Cadmium can also be found in fish and shellfish from some waters.

Health Concerns

Cadmium accumulates in the body, mainly in the kidneys, with continued exposure. Some people with long-term cadmium exposure have had effects on their kidneys, bones and blood.

Lead

Lead can be found in fishing tackle (especially sinkers and jig heads).

Health Concerns

Lead can cause health problems when it builds up in the body. Because the unborn baby and young child are at the greatest risk, it is particularly important for pregnant women, women of childbearing age and young children to minimize their lead exposures. Lead poisoning can slow a child's physical growth and mental development and can cause behavior and other nervous system problems, reproductive problems, kidney and liver damage, blindness and even death in both adults and children.

To reduce exposure to the lead in these products, you should:

- Keep all lead objects away from young children (young children often put their hands and objects in their mouth).
- Wash hands with soap and water after holding or using lead sinkers and jig heads.
- Never put lead sinkers in your mouth. This includes biting down on lead sinkers.
- Never eat, drink, or smoke immediately after handling lead sinkers, wash hands first.
- Take proper precautions when melting lead and pouring sinkers at home.

Consider non-lead alternatives. NYS DOH recommends that non-lead fishing sinkers and lures be used whenever possible. NYS DEC encourages anglers to use non-lead alternatives for sinkers and jig heads to reduce the risk of lead poisoning to birds. New York State law prohibits the sale of lead fishing sinkers (including "split shot") weighing one-half ounce or less. More information is provided on the [NYS DEC website](#).

Good Sanitary Practices While Fishing and Handling Fish

- Good Sanitary Practices While Fishing and Handling Fish is also available as a PDF [in English](#)

Microorganisms such as bacteria, viruses, and parasites are in all waters, and can be found on fish and crabs. These microorganisms may come from combined sewer overflows (CSOs*), faulty septic systems, and animal waste. After heavy rains, levels of fecal contamination can be higher in waters. Assume that all waters can have fecal contamination even if you can't see it.

While fishing and handling fish, take the following precautions to avoid contact with microorganisms which can make you sick:

Fishing

- If you see raw sewage, avoid fishing. Follow advice on any sewage-related signs.
- Keep your hands away from your mouth, eyes, ears, and nose while fishing and cover open wounds to avoid contact with the water. This reduces the chances of getting sick from

- microorganisms that can enter your body through these pathways.
- Wash your hands after fishing, especially before eating, and shower if you have had contact with the water.

Handling and Preparing Fish

Fish and crabs, even from waters with high levels of microorganisms, can be eaten if you follow these good hygiene practices:

- Only keep fish that act and look healthy.
- Wear nitrile, rubber or plastic protective gloves while gutting, filleting, and skinning the fish. Avoid directly handling and preparing fish when you have cuts or open sores on your hands.
- Remove and discard the guts (internal organs) soon after harvest, and avoid direct contact with the intestinal contents.
- Keep fish cool (with ice or refrigerated below 45°F or 7°C) until filleted and then refrigerate or freeze.
- Wash hands, utensils, and work surfaces before and after handling any raw food, including fish.
- Unlike PCBs, mercury and other chemicals, most microorganisms can be destroyed by cooking. Cook fish thoroughly until internal temperature is 145°F or until flesh is pearly and opaque and separates easily with a fork.

*For more information about CSOs visit the DEC website

<http://www.dec.ny.gov/chemical/48595.html>.

Advice on Eating Raw or Partially Cooked Fish and Shellfish

Foods of animal origin, such as pork, poultry, beef, dairy products, eggs, fish and shellfish, can be contaminated with bacteria, viruses or parasites that can cause illness. Persons at high risk (for example, those who are immunocompromised, suffer from liver disease or other chronic diseases) can be more susceptible to and more severely affected by these infectious diseases. This is why we recommend that all of these foods be thoroughly cooked before eating. Government agencies and the food industry strive to minimize contamination of raw animal foods and provide healthful food products.

Bacteria in Clams, Oysters and Mussels

NYS DEC routinely tests clam, oyster and mussel beds for bacteria. Based on these tests, an area may be closed to [shellfish harvesting](#). Contact NYS DEC for more information.

Algal Toxins in Clams, Oysters, Mussels, Scallops, Snails, Crabs and Lobsters

Under certain environmental conditions, some types of marine algae will grow in abundance ("bloom") and produce saxitoxin, a dangerous neurotoxin. These events are generally temporary, occurring midspring to early summer in New York State waters. Because mussels, oysters, clams and scallops filter feed they can concentrate the saxitoxin in their body tissues. Carnivorous snails (conch, whelks and moon snails) can accumulate dangerous levels of the toxin as they feed on contaminated shellfish.

Eating foods contaminated with saxitoxin can cause paralytic shellfish poisoning (PSP), which affects the nervous system and in severe cases can lead to paralysis, respiratory failure and death. Saxitoxin cannot be removed through cooking. If consumption of saxitoxin is suspected, seek medical attention immediately.

NYS DEC monitors shellfish for saxitoxin, and temporarily closes harvest in areas with elevated levels of saxitoxin. Do not harvest or eat clams, oysters, mussels, scallops or carnivorous snails (conch, whelks, and moon snails) from areas closed to shellfish harvest due to saxitoxin.

NYS DOH advises that people not eat the soft green material (mustard, tomalley, liver or hepatopancreas) found in the body section of crabs and lobsters from any waters because cadmium, PCBs and other contaminants as well as toxins produced by some marine algae concentrate there. Because contaminants may be transferred to cooking liquid, people should also discard crab or lobster cooking liquid.

Check the NYS DEC website for [information on shellfish harvest](#) and for [information on saxitoxin and other marine toxins](#). You can also call NYS DEC at (631) 444-0475 for information on shellfish regulations, including areas in which clam, oyster and mussel collection are permitted and at (631) 444-0480 for the latest information on emergency closures.

Freshwater Harmful Blue-green Algae Blooms

Blue-green algae (technically known as cyanobacteria) are microscopic organisms naturally present in lakes and streams. They can become abundant in warm, shallow, undisturbed surface water, forming "blooms" (often called harmful blue-green algae blooms) that discolor the water or form scum on the water surface.

Exposure to blue-green algae and their toxins pose a health risk to people, pets, and livestock. Therefore, you should avoid all water contact (including swimming, wading, and fishing) in areas where you can see blooms, and don't eat fish caught in areas with visible blooms. Rinse exposed skin with clean water if you contact blooms or scum. When a visible bloom is not present, you should follow the fish consumption advice for that waterbody and remember to use good sanitary practices while fishing and handling fish. [View information on the types of advisories.](#) [Learn more about harmful blue-green algae blooms.](#)

Deformed or Abnormal Fish

The health implications of eating deformed or abnormal fish are unknown. Any obviously diseased fish (marked by tumors, lesions or other abnormal condition of the fish skin, meat or

internal organs) should be discarded.

Botulism in Fish

In recent years, large numbers of some species of Lake Erie fish and waterfowl have been found dead, sick and dying, many of them as a result of botulism poisoning. The botulism poison is produced by *Clostridium botulinum*, a bacterium that is common in the environment and can produce harmful levels of botulism poison under some conditions. This poison has been found in some of the affected fish and waterfowl. The botulism poison can cause illness and death if eaten by humans or animals. Cooking may not destroy the botulism poison. This problem may also occur in other waters, and we don't know whether all or only some fish and waterfowl species can be affected. NYS DEC continues to monitor and investigate this problem.

No human cases of botulism poisoning have been linked to these events. However, as a precaution, do not eat any fish or game if they are found dead or dying, act abnormally or seem sick. If you must handle dead or dying fish, birds or other animals, cover your hands with disposable nitrile, rubber or plastic protective gloves or a plastic bag.

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