

BASICS

Dioxins and polychlorinated biphenyls (PCBs) are two groups of toxic chemicals found in terrestrial and aquatic ecosystems across the globe. They are considered **PERSISTENT ORGANIC POLLUTANTS**, because they remain in the environment for a long time.

Animals **TAKE UP** dioxins and PCBs through ingestion, inhalation, and skin contact, although ingestion through food is most common. These pollutants bind to fatty tissue throughout the body, and like many contaminants, they **BIOMAGNIFY**, becoming more concentrated in animals at higher levels of the food chain.

Dioxin and PCB exposure is a health concern for **ALL ANIMALS**, including humans, and is related to diet and habitat. Fish and fish-eating animals are at highest risk of accumulating high levels of dioxins and PCBs. However, animals that eat plants, invertebrates, or contaminated soil can also be exposed. Sensitivity to dioxins and PCBs varies according to species, health status, age, and sex.

Dioxin and PCB toxicosis cause similar **CLINICAL SIGNS**, including wasting and behavioral abnormalities. Exposed animals may also have discolored skin, loss of hair or feathers, and enlarged livers.

In birds, these contaminants can also contribute to eggshell thinning, reduced clutch sizes, and abnormal fetal development resulting in physical deformities.

DIAGNOSIS of dioxin or PCB toxicosis is confirmed by measuring contaminant levels in tissue samples. Cases often go undiagnosed due to their chronic and systemic nature.

There is **NO TREATMENT** for dioxin or PCB toxicosis in wildlife; supportive care can be given.



**HUMAN
HEALTH
RISK**

**INGESTION,
INHALATION,
& SKIN
CONTACT**

ALL SPECIES



DETAILS

Dioxin is a general term for polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (furans or PCDFs). Of the more than 200 dioxin chemicals, seventeen are known to be toxic. Dioxin levels are often reported as the sum of all compounds weighted by their toxicity relative to 2,3,7,8-TCDD, the most toxic form. This value is known as 2,3,7,8-TCDD total equivalence. There are over 200 PCBs; 12 are known as dioxin-like PCBs and can be included in 2,3,7,8-TCDD total equivalence values, but non-dioxin-like PCBs can also be toxic.

Dioxins and PCBs can be released into the environment by waste incineration, improper disposal of products, and hazardous waste sites. While dioxins are primarily emitted as by-products of human activities such as waste incineration and vehicle emissions, PCBs are man-made chemicals used in industrial applications. Dioxins can be released by natural events such as wildfires, but there are no known natural sources of PCBs.

After release, they deposit in terrestrial and aquatic ecosystems where they bind to sediment, organic material, and small invertebrates. When animals, such as birds or fish, eat sediment or invertebrates, they can take up these contaminants. With each step up the food chain, dioxins and PCBs may become concentrated through biomagnification, resulting in potentially high exposures in wild carnivores and humans.

These toxins are present in ecosystems across the world, and many wildlife species have been negatively impacted by contamination, especially regarding reproduction and development.

Exposure to high dioxin levels in Lake Ontario was linked to developmental deformities in snapping turtles, and in British Columbia, great blue heron chicks that hatched from dioxin-contaminated eggs had abnormal brain structures. In the latter half of the 1900s, exposure to dioxins among waterfowl contributed to a high prevalence of Great Lakes embryo mortality, edema, and deformity syndrome. Similarly, wood ducks near

a dioxin-contaminated site in Arkansas experienced decreased productivity and altered fetal development.

Exposure to PCBs has also impaired reproduction in wildlife. In the Northeast US, waterfowl in polluted areas had lower fertility and decreased chick survival, and in NY specifically, exposed songbirds had altered vocalizations, potentially interfering with breeding.

Dioxins and PCBs also cause nonreproductive health problems in wildlife. Waterfowl exposed to these contaminants have suffered from hormonal changes, reduced immune function, and altered liver function. Cetaceans in highly polluted areas of the Baltic Sea demonstrated impaired immune function related to dioxin and PCB exposure. Additionally, stranded sea lions in California had elevated rates of cancer stemming from PCB exposure.

PRECAUTIONS AND PREVENTION Dioxin emissions in the United States have dramatically decreased in the last several decades due to regulations on industrial processes, and PCB manufacturing was banned in the US in 1979. However, both contaminants persist in the environment. To minimize your own contribution to dioxin and PCB emissions, avoid burning trash and take precautions to prevent wildfires. To reduce exposure through food, people who eat wild fish and game should consult local, state, and federal guidelines for consumption advisories. If fishing in NY, visit [New York State Health Advice on Eating Fish You Catch](#) for more information.

Below: Snapping turtles in contaminated waters can have deformed limbs, tails, shells and skulls.

