



BASICS

Dioxins are a group of toxic chemicals emitted primarily as by-products of human activities, such as waste incineration and vehicle emissions, although natural processes like wildfires also release dioxins. Dioxins are found in terrestrial and aquatic ecosystems across the globe and are considered a **PERSISTENT ORGANIC POLLUTANT**, because they remain in the environment for a long time.

Animals **TAKE UP** dioxins through ingestion, inhalation, or skin contact, although ingestion through food is most common. Dioxins 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 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. However, animals that eat plants, invertebrates, or contaminated soil can also be exposed. Sensitivity to dioxins varies according to species, health status, age, and sex.

Dioxin toxicosis can present with a wide variety of **CLINICAL SIGNS**, including wasting and behavioral abnormalities. Exposed animals may also have discolored skin and loss of hair or feathers.

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

There is **NO TREATMENT** for dioxin 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.

When dioxins are released into the atmosphere, they deposit in terrestrial and aquatic ecosystems. Dioxins bind tightly to sediment, organic material, and small invertebrates in aquatic environments. When animals, such as birds or fish, eat sediment or invertebrates, they can take up dioxins. With each step up the food chain, dioxins may become concentrated through biomagnification, resulting in potentially high exposures in wild carnivores and humans.

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

In many wildlife species, dioxins contribute to impaired reproduction and development, including eggshell thinning, reduced clutch sizes, and abnormal fetal development resulting in physical deformities. Dioxins also negatively impact the liver and immune and endocrine systems, and several dioxins are known **CARCINOGENS**. Exposure to high levels of dioxins has been linked to several wildlife mortality events.

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 resulting in neurologic, skin, and liver disorders. Similarly, wood ducks near a dioxin-contaminated site in Arkansas experienced decreased productivity, altered fetal development, and oxidative stress involving increased levels of toxic reactive oxygen compounds.

Dioxins also cause nonreproductive health problems in wildlife. Waterfowl exposed to dioxins 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 exposure.

PRECAUTIONS AND PREVENTION Dioxin emissions in the United States have dramatically decreased in the last several decades due to regulations on industrial processes, but dioxins persist in the environment. To minimize your own contribution to dioxin emissions, avoid burning trash and take precautions to prevent wildfires.

State and federal agencies regulate dioxin levels in food and water, and many states test fish and other game species for dioxins. To reduce exposure through food, people who eat wild fish and game should consult local, state, and federal guidelines for consumption advisories, avoid liver and high-fat tissues, trim fat from game meat, and limit consumption of large fish and game.

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

