

Garabrant, DH, Philbert, MA, Review of 2,4-Dichlorophenoxyacetic Acid (2,4-D) Epidemiology and Toxicology. Critical Reviews in Toxicology 32(4):233-257, 2002.

ABSTRACT:

The scientific evidence in humans and animals relevant to cancer risks, neurologic disease, reproductive risks, and immunotoxicity of 2,4-D was reviewed. Despite several thorough *in vitro* and *in vivo* animal studies, no experimental evidence exists supporting the theory that 2,4-D or any of its salts and esters damages DNA under physiologic conditions. Studies in rodents demonstrate a lack of oncogenic or carcinogenic effects following a lifetime dietary administration of 2,4-D. Epidemiologic studies provide scant evidence that exposure to 2,4-D is associated with soft tissue sarcoma, non-Hodgkin's lymphoma, Hodgkin's disease, or any other cancer. Overall, the available evidence from epidemiologic studies is not adequate to conclude that any form of cancer is causally associated with 2,4-D exposure. There is no human evidence of adverse reproductive outcomes related to 2,4-D. The available data from animal studies of acute, subchronic, and chronic exposure to 2,4-D, its salts, and esters show an unequivocal lack of systemic toxicity at doses that do not exceed renal clearance mechanisms. There is no evidence that 2,4-D in any of its forms activates or transforms the immune system in animals at any dose. At high doses, 2,4-D damages the liver and kidney and irritates mucous membranes. Although myotonia and alterations in gait and behavioral indices are observed after overwhelming doses of 2,4-D, alterations in the neurologic system of experimental animals are not observed with the administration of doses in the microgram/kg/day range. It is unlikely that 2,4-D has any neurotoxic potential at doses below those required to induce systemic toxicity.