

CORRESPONDENCE

Cancer and chlordane-treated homes: a pinch of prevention is worth a pound of cure

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The insecticides chlordane and heptachlor in human body fat and plasma have been linked to many types of cancers (brain, breast, leukemia, lymphoma, prostate, and testicular). The US Environmental Protection Agency (US EPA) calculated that 30 million homes were treated with chlordane from 1950 until it was banned in 1987, and that occupants of these chlordane-treated homes have exposures up to 25 times those found in the average American diet [1,2]. Although the main route of exposure to chlordane/heptachlor is by breathing the air in homes treated for termites, the indoor air level varies markedly depending on where chlordane was applied. Higher concentrations are found when chlordane was applied beneath the house (under the basement floor, concrete slab floor, or enclosed crawl space), while lower levels are associated with treatment only to the soil outside of the foundation. The author has sampled and analyzed chlordane and heptachlor in the indoor air of over 500 homes in the last 15 years, and routinely detects high levels 30+ years after treatment. Considering the US EPA estimates on the number of Americans breathing unsafe levels of chlordane and heptachlor in their homes, it is amazing that no study has investigated chlordane/heptachlor exposures in indoor air and the incidence of cancer in the occupants.

In a recent study, an indirect measure of airborne concentrations of chlordane in homes was linked to lymphoma. Lymphoma risk increased up to 3.5-fold with chlordane levels in the carpet of homes treated

for termites [3]. These results are consistent with other studies reporting that lymphoma risk increases 3- to 4-fold as the levels of chlordane/heptachlor and/or their metabolites (oxychlordane and heptachlor epoxide) increase in human body fat [4,5] and in plasma [6]. In these studies, the cancer risk for chlordane/heptachlor exposure was markedly higher than for the other chemicals evaluated: polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and a variety of other insecticides.

Chlordane and heptachlor have been reported to be some of the most potent carcinogens assessed in laboratory animals [7]. Chlordane potency was in the upper 50% of all tested carcinogens, while heptachlor potency was four times greater, placing it in the top 25%. Chlordane and heptachlor are complete carcinogens, meaning that they can initiate the cancer (e.g. DNA damage), promote cancer growth, and aid in the progression of metastases. This author reported that human leukocytes exposed to heptachlor, at levels found in the blood of occupants of chlordane-treated homes, induced oxidant production that caused DNA strand breaks [8]. Oxidant production was eliminated by first treating leukocytes with specific chemicals that block the estradiol receptor, indicating that heptachlor is a hormone disruptor that damages cells by binding to the estradiol receptor. Heptachlor also activated kinase signaling pathways [9–11] known to be activated in various types of cancer. Increases in the activity of these kinases result in cellular proliferation that promotes growth of cancers.

Cancer patients should not live in homes contaminated with chlordane and heptachlor in the air. Indoor air testing for these insecticides is also recommended for persons buying homes built prior to 1990, and for persons living in older homes who are experiencing non-cancer symptoms linked to these insecticides (see 'When you should test' in www.toxfree.net).

Declaration of interest: Dr. Richard A. Cassidy is the sole author of the manuscript. Dr. Cassidy is the owner of the company ToxFree, Inc. which receives income from the sale of testing kits for cyclodiene insecticides for residential use.

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