

Diabetes: The Risk of Living in Some Older Homes

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Obesity has been accepted as a risk factor for diabetes but the results of a published seminal study now reveals that banned fat-soluble insecticides may be the real risk factor. The insecticides having the greatest association with diabetes are compounds of technical chlordane (heptachlor, cis-chlordane, trans-chlordane, or trans-nonachlor), and especially their metabolites (heptachlor epoxide and oxychlordane) that accumulate with time in lipid compartments of the body. This initial investigation showed that the association between obesity and diabetes was absent in people who had non-detected or very low levels of organochlorine insecticides in their blood (1). However, the expected association between obesity and diabetes/insulin resistance increased as these insecticides levels increased (see 2nd article – POPsible nightmare, Audio – Living on Earth.

www.loe.org/shows/shows.htm?programID=06-p13-00050#feature2).

Now additional studies have linked these insecticides, especially heptachlor epoxide and oxychlordane, with diabetes (2-8). The impact of oxychlordane and heptachlor epoxide on human health has expanded with the link between these compounds and insulin resistance, metabolic disease, obesity, and peripheral arterial disease (9-14). One way these chlordane compounds may cause insulin resistance and diabetes is by their pro-oxidant effects. Oxidants damage cells that produce insulin and induce insulin resistance (15). The author of this article has reported that heptachlor epoxide, at levels found in US citizens, increases oxidant production from exposed human white blood cells resulting in DNA and cellular damage to surrounding cells (16) (see fig. 2 in <http://www.toxfree.net/chlordane/Cassidy/cassidypdf/BreastCancer.pdf>). Animal studies using different concentrations of these insecticides have shown a causal relationship between low exposure and weight gain (17) (see fig. 3 in <http://www.toxfree.net/chlordane/Cassidy/cassidypdf/TAP.pdf>).

All of these insecticides are in the same class of organochlorines called cyclodienes first made in the 1940s. Their development was by chance, during a search for possible uses of a by-product of synthetic rubber manufacturing. By chlorinating this by-product, persistent and potent insecticides were easily and cheaply produced. The chlorines, 7 in the case of heptachlor, 8 in trans-chlordane, oxychlordane, aldrin, and dieldrin, and 9 in trans-nonachlor surround and stabilize the cyclodiene ring (the carbon skeleton).

These cyclodienes, all members of the “Dirty Dozen”, are still found in food, especially animal fat, and in indoor air of homes treated for termites prior to the ban of

chlordane/heptachlor in 1988. Breathing these vapors is the main route of exposure for occupants of treated homes with exposure levels approximately 25 times the levels ingested in food (18). A more recent study (2003) shows that levels of these insecticides are still elevated in air in a high percentage of homes

(http://www.rachel.org/files/document/Phthalates_Alkylphenols_Pesticides_Polybromina.pdf

with 50-60% of the homes having levels 4-40 times the US Environmental Protection Agency (USEPA) guidelines (19). The author has generated tables of the levels of these insecticides in air of homes tested during the last 5 years

http://www.toxfree.net/chlordane/Cassidy/levels_graph.html and the relative risks (up to 200 fold) of breathing these insecticides compared to minimal risk levels published by the Agency for Toxic Substances and Disease Registry

http://www.toxfree.net/chlordane/Cassidy/risks_graph.html. The main determinant of these higher contaminations is application of technical chlordane beneath the home compared to outside the foundation – under the basement floor, in the soil of an enclosed crawl space, or under concrete slab - where offgassing vapors are released into the air of the home. The adverse public health effects of breathing these insecticides are under-appreciated considering that 30 million homes were treated with technical chlordane.

Since termite infestation and treatment increases in warmer climates, a higher percentage of homes located in Southern states will be contaminated with compounds in technical chlordane (see USEPA map below). Therefore, if these insecticides cause diabetes, then the prevalence of diabetes should be higher in Southern states compared to the rest of the country. A causal relationship is apparent when comparing homes treated with these insecticides (left figure) and the prevalence of diabetes (right figure) (20),

(<http://www.toxfree.net/chlordane/Education/Healthrisk/healthlinks.html>).

For details see CDC update in diabetes prevalence -

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6145a4.htm>. Amazing a study comparing the body burden of these cyclodiene insecticides in occupants of treated homes and air concentrations/durations of exposure with prevalence of diabetes, obesity or other chronic diseases has not been conducted.

Considering the effects of diabetes on the individual and the economic health of our nation, increasing public awareness to the health risks associated with breathing chlordane compounds in air of homes is vital. If you have questions, email Dr. Cassidy at racassidy@pisci.net or call 888.836.4489.

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