

## **Chronic Health Effects and Immunological Alterations Associated With Exposure to Pesticides- ( Information on Concentrations of Chlordane in two of the homes is appended at the end of Discussion)**

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Patients with multiple subjective health complaints associated with confirmed inhalation exposure to chlordane, malathion and Dursban were examined for signs of immune activation and the presence of autoantibodies. Elevated CD26 (Ta1) cells and a high frequency of autoantibodies were found. These subjects have an activated immune system as determined by the presence of CD26 cells and autoantibodies. It appears that exposure to pesticides leads to chronic symptomology that is associated with autoantibodies and elevated CD 26 cells.

### **INTRODUCTION:**

A pesticide is a biocide (i.e. it kills life). Information on toxicity is obtained from toxicological tests performed on target organisms, laboratory species (non-mammalian and mammalian), and acute human exposure. However, when it comes to long-term health effects on humans, little or no information is available. Thus, human exposure to a pesticide is examined from acute symptomology, while chronic health effects are either ignored or accepted as not related to the exposure. In this communication we will present the results of immunological studies on patients with chronic health complaints following exposure to chlordane and organophosphates (Malathion, Dursban).

### **CHLORDANE -- INTRODUCTORY COMMENTS**

Chlordane and its isomers are metabolized via mixed function oxidase (cytochrome P450) and glutathione S-transferase system.<sup>7,8</sup> The major metabolites, trans-nonachlor, oxychlordane and heptachlor epoxide are readily detected in the blood of pesticide applicators.<sup>9</sup> Chlordane, heptachlor, and heptachlor epoxide are carcinogenic in rodents, causing hepatic and extra hepatic tumors.<sup>10,11</sup> Evidence for carcinogenicity in humans rests upon case histories. Exposure to the pesticide is associated with neuroblastoma<sup>12</sup> and myelomonocytic, myeloid and lymphatic leukemias.<sup>13-15</sup> Other blood dyscrasias include aplastic anemia, megaloblastic anemia, pernicious anemia, idiopathic thrombocytopenia purpura, and hemolytic anemia.<sup>12-16</sup> One of the known causes for the latter three dyscrasias is autoimmunity.<sup>17</sup> In this section we report the presence of elevated CD26 (Ta1) cells and a high incidence of autoantibodies in 24 subjects with chronic health complaints following chlordane/heptachlor application in their homes for termite infestations.

**In conclusion**, individuals chronically exposed to chlordane/heptachlor following application in their homes, develop multiple organ symptoms. These follow an initial flu-like illness. In addition, elevated CD26 cells suggest that an immune activation has occurred in these patients. Commensurate with this elevation is the presence of multi-

organ autoantibodies, including ANA and antimyelin. Thus, it seems probable that chronic exposure to chlordane/heptachlor is associated with an autoimmune disorder that heretofore has been described. Perhaps, autoimmunity is at the basis of their chronic health problems.

The patients in this study, with the exception of the pheochromocytoma and the two G-B syndromes, have had negative diagnostics with respect to their chronic multiple symptomology. For the most part their attending physicians were either puzzled by the illness or denied that chlordane/heptachlor could cause their health problems. Psychiatric evaluation in some cases was recommended. Perhaps, their multiple health problems do have an underlying etiology, such as immune activation and autoimmunity. For example, multiple organ symptoms do occur in systemic LE and mixed connective tissue disease.<sup>17</sup>

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