

# PESTICIDES AND THE IMMUNE SYSTEM



Little is known about how pesticides affect the immune system. It is probable that certain pesticides can affect the human immune system, thereby suppressing normal immune responses to viruses, bacteria, parasites and tumors. Exposure to pesticides such as organophosphates, organochlorines, carbamates and metallic pesticides may produce significant changes in immune system structure and function, by reducing and altering T cell populations, reducing lymphocyte proliferative response, reducing cell-killing activity, and altering antibody levels in circulation.<sup>1</sup> These changes can be accompanied by increased risks of chronic health disorders including infectious diseases and cancers associated with immunosuppression.<sup>2</sup>

While susceptible populations are more likely to suffer adverse health effects from such immune suppres-

sion, healthy populations may also be impacted. Experimental evidence based on in vitro and in vivo models suggests that many pesticides may damage the immune system.<sup>3</sup> Additionally, limited data indicate there is a significant potential risk to chronic low-level doses of pesticides.<sup>4</sup> More research is needed to determine the impact of chronic low-dose pesticide exposures as well as the synergistic impacts of chronic multiple low dose exposures on the immune system.

While the fact that some pesticides can produce allergic reactions does not imply immunosuppression, it establishes that pesticides can sensitize the immune system. Several controversial syndromes such as Multiple Chemical Sensitivity, Chronic Fatigue Syndrome and Gulf War Syndrome may be a result of exposures to pesticides and other chemicals, according to a growing body of research.<sup>5,6,7,8</sup>

## **MULTIPLE CHEMICAL SENSITIVITY (MCS)**

MCS is a controversial syndrome characterized by multiple symptoms in multiple organs that occur reproducibly in response to low levels of chemical exposure or multiple unrelated chemicals previously tolerated, and which appear to improve or resolve when incitants are removed. Chronic Fatigue Syndrome, Fibromyalgia and Gulf War Syndrome have all been linked to MCS.

MCS may be associated with a sudden acute exposure to a pesticide or with chronic low dose exposure. Patient histories suggest that over time more organ systems become involved. Studies indicate that ongoing exposures to pesticides are sometimes associated with MCS.<sup>9</sup> Some researchers believe that MCS is caused by toxic injury that may involve the immune, endocrine and/or nervous systems as well as impairments in detoxification, energy and neurotransmitter metabolism.<sup>10</sup> They have posited relationships between MCS and various protein, mineral, and other nutrient deficiencies and gastrointestinal changes such as candida, parasites, reduced chymotrypsin (a marker enzyme for reduced pancreatic enzyme function), gluten intolerance, and reduced Secretory IgA.<sup>11</sup>

Many clinicians who treat MCS advise that eliminating exposures

that cause repeated symptoms is a critical strategy for preventing sensitization and MCS. It also significantly reduces the degree of disability in persons with MCS. Affected persons suffering disability can utilize the Americans with Disability Act to request reasonable accommodations for work, home (condo, apartment), and school.<sup>12</sup>

Researchers in this field emphasize that, in order to understand this syndrome, studies must be conducted with MCS patients that demonstrate the role of low-level chemical exposure in a controlled environment.<sup>13</sup> Existing psychiatric, personality, cognitive/neurologic, immunologic, and olfactory studies that compare subjects with primary chemical sensitivity to control groups have yet to determine causality because the studies have been cross-sectional.<sup>14</sup>

1 Repetto, R. and S. Baliga (1996). "Pesticides and the Immune System: The Public Health Risks." Washington, D.C. World Resources Institute.

2 Ibid.

3 Ibid.

4 Ibid.

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6 Rowat, S. (1998 Suppl1). "Integrated defense system overlaps as a disease model: With examples for multiple chemical sensitivity." *Env Hlth Persp* 106: 85-109.

7 Bell, I.R., L. Warg-Damiani, C.M. Baldwin, et al. (1998). "Self-reported chemical sensitivity and wartime chemical exposures in Gulf War veterans with and without decreased global health ratings." *Mil Med* 163: 725-32.

8 Miller, C.S. (1996). "Chemical Sensitivity: Symptom, syndrome or mechanism for disease?" *Toxicology* 17: 69-86.

9 Albert H. Donnay (1999). "On the recognition of MCS in medical Literature and Government Policy." *International Journal of Toxicology*, 18,#6.

10 Ashford, N., and Miller, C. (1998). "Chemical Exposures: Low Levels and High Stakes." New York, Wiley & Sons.

11 Ibid.

12 Grace Zeim, M.D. (1999). "Profile of Patients with Chemical Injury and Sensitivity." *International Journal of Toxicology*, 18, #6.

13 Fiedler, Nancy and Howard Ripken (1997). "Chemical Sensitivity: The Scientific Literature." *Environ Health Perspect* 105 (Suppl 2):409-415.

14 Ibid.