Pesticides and Respiratory Disease

Pesticides can precipitate or exacerbate respiratory tract disorders. Several pesticides are known sensitizers and can result in respiratory allergic reactions such as asthma. Overexposure to organophosphates or carbamates can cause cholinesterase inhibition, resulting in bronchoconstriction, increased airway secretions, and respiratory distress.

PESTICIDES AND ASTHMA IN CHILDREN

Asthma rates among children have reached epidemic proportions; rates have nearly doubled over the past two decades. Almost five million U.S. children now suffer from the illness.[1] Maryland's asthma rates, particularly in Baltimore, are among the highest in the country. The number of emergency room visits, hospitalizations, and deaths indicate the severity of asthma is also increasing.[2]

Some experts believe that increasing exposure to pesticides may contribute to these trends. There are several reasons why children are more susceptible to airborne health hazards. Children have a more rapid respiratory rate and greater volume per unit of body weight, and greater average activity level with faster respiratory rates.[3] Young children are also naturally closer to the ground, where chemicals denser than air tend to accumulate. Furthermore, the terminal airways of the lung are not fully developed until the child is a few years old, thereby making a child in the first few years of life more vulnerable to the effects of pesticides on the respiratory system.[4]

While some argue that pesticides are necessary to control pests such as cockroaches to eliminate them as triggers of asthma attacks, in fact some of the pesticides used to control these pests may also contribute to the asthma epidemic. EPA's manual for health professionals, entitled *"Recognition and Management of Pesticide Poisonings,"* states the following regarding organophosphate poisoning: "The critical symptoms in management are the respiratory symptoms."[6]

Studies indicate that overexposure to several classes of pesticides used in Maryland may be linked with respiratory disease, including: pyrethrins and pyrethroids (permethrin, sumethrin, cyfluthrin), organophosphates (chlorpyrifos,

malathion, naled), carbamates (carbaryl, carbuforan), organochlorines (lindane used in lice products), fumigants, and rodenticides. The pesticides permethrin and sumethrin, synthetic pyrethroids, are widely used in Maryland to manage mosquito populations for both nuisance control and to prevent arboviruses such as West Nile virus. Pyrethoids such as permethrin and sumethrin can exacerbate existing respiratory illness.[7]

The Maryland Department of Health and Mental Hygiene states the following precaution on their website: "People with existing respiratory problems, including asthma, allergies, and emphysema, are encouraged to stay indoors during spray events since pyrethroids may aggravate these conditions."[8]

Acute organophosphate and N-methyl carbamate poisoning may cause bronchospasm and bronchorrhea, which can produce tightness in the chest, wheezing, productive coughing, and pulmonary edema.[9] Several organophosphate and N-methyl carbamate insecticides also appear to have a methacholine-like effect on the lungs.[10] Organochlorines can be absorbed by the lungs (and also from the gut and across skin) in varying degrees, and severe poisoning may cause seizures followed by respiratory depression.[11] Symptoms of overexposure to certain fumigants may include upper respiratory irritation, pulmonary edema, and dyspnea.[12] Certain rodenticides may produce acute and long-term dyspnea upon exertion.[13]

Herbicides used in Maryland that are also linked to respiratory tract irritation include phthalates (DCPA, acifluorfen), triazines (atrazine, simazine, cyanazine, metribuzine), dicamba, EPTC, bentazone, and glyphosate (Round-Up).[14, 15]

1 *Centers for Disease Prevention and Control (2002). "Asthma's Impact on Children And Adolescents. Air and Respiratory Health Branch, National Center for Environmental Health." Available online at http://www.cdc.gov/nceh/airpollution/asthma/children.htm.*
2 *Peat, J.K. and J. Li (1999). "Reversing the trend: Reducing the prevalence of asthma." J Allergy Clin Immunol 103: 1-10.*
3 *Solomon, Gina (2000). "Pesticides and Human Health: A Resource for Health Care Professionals." Published by Physicians for Social Responsibility and Californians for Pesticide Reform. Available online at http://www.sfbaypsr.org/publications.html.*
4 *Ibid.*
5 *Togias, A.G. (1997). "Evaluating the factors that relate to asthma severity in adolescents." Int. Arch Allergy Immunol.*
6 *Reigart, JR and Roberts, JR (1999). "Recognition and Management of Pesticide Poisonings, Fifth Ed." U.S. Environmental Protection Agency, EPA 735-R-98-003. Available online at http://www.epa.gov/oppfead1/safety/healthcare/handbook/handbook.htm.*
7 *Box, SA and Lee MR (1996). "A Systemic Reaction Following Exposure to a Pyrethroid Insecticide." Hum Exp Toxicol 15:389-90.*
8 *Maryland Department of Health and Mental Hygiene (2002). "Q and A's About Pyrethroids." Available online at: http://www.cha.state.md.us/oeh/html/pyrethoids.html.*
9 *See note 6 above.*
10 *Underner, M., F. Cazenave, and F. Patte (1987). "Occupational asthma in the rural environment." Rev Pneumonol Clin 43: 26-35.*
11 *See note 6 above.*
12 *National Environmental Education and Training Foundation (2003). "National Pesticide Practice Skills for Medical and Nursing Practice." Available online at: http://www.neetf.org/Health/PestMgmnt.pdf.*
13 *Ibid.*
14 *Maryland Department of Agriculture (2000). "MD Pesticide Statistics for 2000."*
15 *See note 6 above.*