

A Biological Monitoring Survey of Organophosphate Pesticide Exposure Among
Children Residing in Two Communities in the Seattle Metropolitan Area

by

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agricultural communities. (Simcox et al, 1995, Lowenherz et al, 1997) There are no published studies identified to date that have examined low-level, chronic OP exposures in children residing in metropolitan communities.

insecticides have been developed which are now one of the most widely used classes of pesticides worldwide. In a 1995 biological monitoring study of adults, Hill et al also revealed the pervasiveness of pesticide residues in the environment, including organophosphates. In this study it was found that 82% of the subjects had detectable concentrations of the urinary analyte 3,5,6-trichloro-2-pyridinal. This analyte is indicative of exposure to the organophosphate chlorpyrifos, which is commonly used as a household insecticide. (Hill et al, 1995)

Although OP's are less environmentally persistent than the organochlorines, they are more acutely toxic to humans and other species. The non-target consequences of these pesticides are less readily identifiable, but may include adverse human health outcomes from chronic exposure to organophosphate residues.

Due to the widespread use of OP's, there are multiple opportunities for exposure to their residues in the general population. Children, in particular, may be especially susceptible to OP exposure due to behavioral, dietary, and physiological characteristics associated with development. Because of these unique characteristics, the potential risk to children's health resulting from exposures to toxicants in the environment has become a public health concern. (NRC, 1992) To date, most pesticide exposure studies focusing on children have examined specific acute poisoning incidents with known or probable sources. While there are few published studies that examine low-level, chronic pesticide exposures, these studies were conducted on children living in suspected high exposure populations. For example, low-level, chronic organophosphate exposure studies conducted in Washington State examined children of farmworkers and children residing in

I. INTRODUCTION

Pesticides are widely used in the United States both in residential and agricultural settings. When used properly, pesticides can be effective in the control of a variety of pests including insects, weeds, rodents, and fungi. Commercial and consumer application of pesticides has become a common practice for control of pests in non-agricultural environments. According to the National Home and Garden Pesticide Use Survey prepared by the United States Environmental Protection Agency (EPA) in 1990, 75% of American households use insecticides. (Grossman, 1995) The EPA's Non-Occupational Pesticides Exposure Study (NOPES) conducted during 1986-1988 revealed the ubiquity of pesticide residues in households in the general population. In this study, air monitoring was performed to assess pesticide residues in homes in two separate non-agricultural communities. Results indicated that nearly all of the homes sampled had measurable residue levels. Seasonal variation was also observed with residue levels increasing from winter to spring. (Whitmore et al, 1994)

The effects of pesticides on non-target organisms and the environment have been a source of worldwide concern for decades. Perhaps the most well-known non-target consequences were those of the environmentally persistent DDT (dichlorodiphenyltrichloroethane), an organochlorine insecticide which was found to have deleterious effects on certain species of birds and fish. The ecological problems associated with their chemical stability, and concern about the effects of accumulation of organochlorines in human tissue, resulted in bans or severe restrictions on most of these agents in the United States. In their place, the chemically unstable organophosphate (OP)