Organophosphorus Insecticides: Dialkyl Phosphate Metabolites

Organophosphorus insecticides are chemicals used to kill many types of insects. These chemicals account for a large share of all insecticides used in the United States, including those used on food crops. Most home uses of organophosphorus insecticides have been phased out in the United States. Certain organophosphorus insecticides (e.g., malathion, naled) are also used for mosquito control in the United States.

How People Are Exposed to Organophosphorus Insecticides

People are exposed to organophosphorus insecticides by eating foods treated with these chemicals. Exposure can also occur from hand-to-mouth contact with surfaces contaminated with the insecticides. Less common exposures include breathing in the insecticides or absorbing them through the skin. Farm workers, gardeners, florists, pesticide applicators, and manufacturers of these insecticides may have greater exposure than the general population.

Once they enter the body, about 75% of the organophosphorus insecticides in use in the U.S. are converted to breakdown products called dialkyl phosphate metabolites. These metabolites are not considered toxic, but indicate an exposure to organophosphate insecticides.

How Organophosphorus Insecticides Affect People's Health

A sudden exposure to large amounts of organophosphorus insecticides may lead to health problems such as nausea, vomiting, irregular or slow heartbeat, difficulty breathing or tightness in the chest, salivation, weakness, paralysis, and seizures.

When people are exposed over a long period of time to smaller amounts of these pesticides, they may feel tired or weak, irritable, depressed, or forgetful.

Levels of Organophosphorus Insecticides: Dialkyl Phosphate Metabolites in the U.S. Population

In the *Fourth National Report on Human Exposure to Environmental Chemicals* (*Fourth Report*), scientists with the CDC scientists measured six different dialkyl phosphate metabolites in at least 1,903 participants aged 6–59 years old who took part in the National Health and Nutrition Examination Survey (NHANES) during 2003–2004. Prior survey periods of 1999–2000 and 2001–2002 are also included in the *Fourth Report*. By measuring dialkyl phosphate metabolites in urine, scientists can estimate the amounts of organophosphorus pesticides that have entered peoples' bodies.

- In the *Fourth Report*, levels are similar to those of previous survey periods, lower than the levels found in some studies in other countries, and much lower than levels seen in workers who used organophorphorus insecticides.

Finding measurable amounts of dialkyl phosphate metabolites in urine does not mean that the levels of dialkyl phosphate metabolites cause an adverse health effect. Biomonitoring studies of dialkyl phosphate metabolites provide physicians and public health officials with reference values so that they can determine whether or not people have been exposed to higher levels of organophosphorus pesticides than are found in the general population. Biomonitoring data can also help scientists plan and conduct research on exposure and health effects.

For More Information

- Centers for Disease Control and Prevention
  Health Studies: Pesticides
  http://www.cdc.gov/nceh/hsb/pesticides/

- Environmental Protection Agency
  Types of Pesticides
  http://www.epa.gov/pesticides/about/types.htm

  Pesticide Re-registration Status for Organophosphates
  http://www.epa.gov/pesticides/reregistration/status_op.htm

- National Institute for Occupational Safety and Health
  Pesticide Illness and Injury Surveillance
  http://www.cdc.gov/niosh/topics/pesticides/

- National Pesticide Information Center
  Recognition and Management of Pesticide Poisonings, 5th Edition, Chapter 4
  http://npic.orst.edu/RMPP/rmpp_ch4.pdf
  Report Home Page: http://npic.orst.edu/rmpp.htm

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