School Pesticide Monitor

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Mothball Pesticide Linked to Health Effect in Children

A new study finds that children exposed to high levels of naphthalene, a common air pollutant and the active ingredient in mothballs, are at increased risk for chromosomal aberrations (CAs) that have been associated with increased cancer risk in adults. These include chromosomal translocations, a potentially more harmful and long-lasting subtype of CAs, which are of special concern as they result in a portion of one chromosome juxtaposed to a portion of another chromosome, potentially scrambling the genetic script.

"Translocations can persist for years after exposure. Some accumulated damage will be repaired, but not everyone's repair capacity is the same. Previous studies have suggested that chromosomal breaks can double an adult's lifetime risk for cancer, though implications for children are unknown," says Manuela A. Orjuela, MD, ScM, one of the study's authors.

The researchers followed 113 children, age 5, who are part of a larger study in New York City. They assessed the children's exposure to naphthalene by looking at levels of its metabolites in urine samples. (Metabolites are products of the body's metabolism, and can serve as a marker for the presence of a chemical.) Researchers also measured CAs in the children's white blood cells using a technique called fluorescent *in situ* hybridization.

Chromosomal aberrations were

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Congressman Asks FDA to Ban Toxic Lice Treatment

Congressman Edward J. Markey (D-Mass.) has asked the U.S. the Food and Drug Administration (FDA) to halt the use of the insecticide lindane in pharmaceutical treatments for head lice in children. Despite research on its toxicity and ineffectiveness, FDA continues to allow lindane to be used in prescription shampoos and lotions to treat cases of lice and scabies, overwhelmingly on children.

Lindane has been found to cause skin irritation, seizures, and, in rare instances, even death. Children and infants are especially sensitive to the health risks posed by pesticides such as lindane because of their developing bodies. In 2005, the U.S. Department of Health and Human Services determined that lindane could cause cancer in humans, and the EPA cancelled all pesticide registrations for agricultural uses of lindane in 2006 because of its toxicity to humans and persistence in the environment. A 2002 study that compared efficacy of five available products on head lice found that lindane was the least effective of all the products.

"In the case of lindane, the cure is worse than disease," said Rep. Markey. "There is not a nit of scientific evidence to support the FDA's decision to continue to allow the use of this toxic chemical for treatment used predominantly on children."

Rep. Markey's letter also notes that the presence of lindane in treatment products has led to its detection in and contamination of waterways. Officials in Los Angeles found that a single treatment for head lice or scabies contains enough lindane to bring six million gallons of water above the California water quality standard. The pharmaceutical use of lindane was banned in California in 2002. And in 2009, more than

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Mothballs

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present in 30 children; of these, 11 had translocations.

Napthalene is classified as a possible carcinogen by the International Agency for Cancer Research. Inhalation of vapors is linked to nasal tumors in laboratory animals. It has also been associated with non-Hodgkin Lymphoma and blood disorders, including several types of anemia. Studies have shown reactions including acute hemolysis, jaundice and death in infants wrapped in blankets that had been stored with mothballs. German workers exposed to naphthalene were found to have a variety of cancers, including laryngeal, gastric, nasal, and colon cancer.

Napthalene belongs to a class of air pollutants called polycyclic aromatic hydrocarbons (PAH). Prior research has established a link between prenatal exposure to PAH and increased risk for childhood obesity, IQ deficits, and CAs. This new study is the first to present evidence in humans of CAs, including translocations, associated with exposure to one specific PAH—naphthalene—during childhood.

To obtain a better sense of the long-term consequences of naphthalene exposure, Dr. Orjuela and other investigators are following some of the children in the study as they reach fourth grade. While they expect to see further translocations, they do not expect to see any signs of cancer in the white blood cells.

"So far, the translocations seem to be random, and there has been no evidence of the specific translocations that are known to be associated with leukemia. This is entirely expected; leukemia is very rare." Frederica Perera, DrPH, senior author on the paper, adds that, "The findings provide yet more evidence of the vulnerability of the young child to carcinogenic air pollutants."

Apart from mothballs, crystalline naphthalene is used as a deodorizer for diaper pails and toilets. It is also used as an intermediate in the manufacture of a wide range of products, including phthalate plasticizers, resins, dyes, pharmaceuticals, insect repellents, and other products. Since naphthalene easily vaporizes, its gas has a variety of other fumigant uses, including use as an insecticidal soil fumigant.

Researchers from the Columbia Center for Children's Environmental Health (CCCEH) at the Mailman School of Public Health, Columbia University Medical Center, and the Centers for Disease Control and Prevention (CDC) published the findings in *Cancer, Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research. The abstract is available online at:
http://bit.ly/KUpaEY

Congressman

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160 nations agreed to ban the agricultural use of lindane.

Rep. Markey's letter to FDA asks for responses to questions that include:

• Why is this compound still allowed for use on children even after the FDA noted that lindane is especially harmful to this segment of the population?

• Has the FDA taken into consideration the long-term chronic impacts that lindane exposure may have on children?

• Has the FDA evaluated the increased resistance that head lice and scabies have developed to lindane treatment?

• If FDA determined that approval of lindane as a treatment for head lice and scabies was no longer warranted because of safety and efficacy concerns, what immediate actions could FDA take to halt the use of lindane and to ensure the public is protected from this dangerous chemical?

Head lice affect an estimated 12 million people in the U.S. each year, and are rapidly becoming resistant to over-the-counter and prescription medications. According to researchers on alternative lice treatments, one method for eliminating head lice that will not lead to resistant strains of lice is the use of hot air, which desiccates the insects and eggs, thus killing them.

For information on controlling head lice without toxic chemicals, see Beyond Pesticides' Head Lice Factsheet available on our Alternatives Factsheets webpage listed under the Info Services tab on our Homepage.

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