



Endocrine Disruptors in Indoor Air and Dust in Cape Cod, MA, Homes

Article Title: Phthalates, Alkylphenol, Pesticides, Polybrominated Diphenyl Ethers, and Other Endocrine Disrupting Compounds in Indoor Air and Dust

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Journal: *Environmental Science & Technology* (published on line Sept. 13, 2003)

In the Cape Cod Breast Cancer and Environment Study, we measured concentrations of 89 different chemicals identified as endocrine disrupting compounds (EDCs) in indoor air and house dust samples from 120 homes on Cape Cod. EDCs are chemicals that can mimic or interfere with human hormones. Overall, we detected 52 different compounds in air and 66 in dust. These are the first reported measurements in indoor environments for over 30 of the compounds. Results of the study are reported in a scientific article (listed above) and summarized here. The Massachusetts Department of Public Health, foundations, and charitable donations funded the study.

What types of chemicals did you find and where do they come from?

We found many different types of chemicals that are used in plastics, detergents, furniture, carpets, electronic equipment, pesticides, and cosmetics. Table 1 provides information on the major chemical classes and potential sources. We expected to find many of these compounds in homes, as they are in widely used pesticides, detergents, plastics, and furniture, as well as personal care products such as cosmetics and hair products.

Which chemicals were found at the highest concentrations?

We found phthalates and alkylphenols at the highest concentrations in both dust and air.

How many different chemicals were found in a typical house?

The number of chemicals detected in a home ranged from 13-28 for indoor air and from 6-42 for dust. The average number of chemicals per home was 19 for air and 26 for dust.

Are levels on Cape Cod higher than levels elsewhere?

Some comparison data from other locations are available for some pesticides, PAHs, PCBs, PBDEs, and phthalates. Indoor air concentrations we measured on Cape Cod are generally similar to levels reported elsewhere. In house dust, some regional differences were observed. PBDEs measured on Cape Cod were about ten times higher than levels reported in two studies in Europe, where these compounds are not used as much. PAHs were lower than on Long Island but higher than in other regions of the US. For pesticides, levels of DDT, carbaryl, chlordane, methoxychlor, propoxur, and pentachlorophenol appear higher on Cape Cod than in

other regions; while levels of diazinon and permethrin appear lower, and chlorpyrifos appears similar. Comparisons must be interpreted with caution because methods of sample collection are different between studies.

Did detected levels exceed government standards?

There are no regulatory standards for contaminants in indoor air and house dust. US EPA has issued health-based exposure guidelines for about half of the compounds in our study. Where these guidelines exist, levels we measured are often below the guidelines. However, for 15 compounds, including bis(2-ethylhexyl) phthalate (from plastics) and some pesticides and PCBs that are currently banned, we measured levels in some samples that exceeded the guidelines. These chemicals are still found in and around homes worldwide, sometimes at levels exceeding health guidelines, because they break down very slowly.

What are the public health implications of these findings?

This study demonstrates that chemicals from common consumer products affect indoor air quality and are found in house dust, providing an ongoing opportunity for exposure. However, not enough is known about the potential health effects of these exposures to determine whether they pose significant health risks. By studying these compounds and how women may be exposed, we will learn which exposures are most important. In this way we hope to identify ways to reduce health risks by reducing exposure, and to prioritize chemicals with high exposures for more rigorous health effects testing.

How does an endocrine disrupting compound affect health?

Chemicals identified as endocrine disrupting compounds can mimic or disrupt our bodies' hormone systems. This means they can interfere with cell growth and development. Endocrine disrupting chemicals are being studied to see how they affect child development, reproduction, and hormonal cancers like breast and prostate cancer.

Did you look for all the endocrine disrupting chemicals?

There is no comprehensive list of endocrine disrupting chemicals, and most of the 87,000 chemicals in use have not been tested to determine whether they affect hormone systems. We tested for chemicals that scientists have reported to be endocrine disruptors. We prioritized chemicals that have consumer uses or are produced in large quantities.

What additional analyses of these data are underway?

We are analyzing data on urinary levels of phthalates and pesticides in relation to air and dust measurements in order to understand major pathways of exposure. We are also analyzing the relationship between individuals' self-reported pesticide and product use data and measured air, dust, and urine levels. Finally, we are identifying commonly occurring mixtures of chemicals.

How can I get more information?

Additional information is found on our web site at www.SilentSpring.org. To request a copy of the article, or for other information, please contact Anna Batty at Silent Spring Institute (Phone: 617-332-4288. Email: info@SilentSpring.org).

Table 1. Chemical classes, potential sources and example chemicals for compounds measured in the study.

Chemical Class	Potential Sources	Example Chemical
Phthalates	Plastic, nail polish and other cosmetics	dibutyl phthalate
Alkylphenols	Detergents, plastic, pesticide formulations	nonylphenol
Flame retardants	Furniture foam or stuffing, carpets and drapes, electronic equipment (TVs, computers)	polybrominated diphenyl ether (PBDE 47)
Polycyclic aromatic hydrocarbons (PAHs)	Combustion sources such as fireplaces; stoves and heaters, cigarette smoke, outdoor air pollution and auto exhaust	benzo(a)pyrene
Polychlorinated biphenyls (PCBs)	Older electrical equipment	PCB 52
Banned pesticides	Historical pesticide use in/near the home	DDT, dieldrin, chlordane
Current-use pesticides	Recent pesticide use in/near the home	Chlopyrifos, permethrin
Other phenols and miscellaneous	Disinfectants, polycarbonate plastics, cosmetics	o-phenyl phenol, bisphenol A, parabens