

# Harmful pesticides found in everyday food products

## Mercer Island children tested in yearlong study

*Wednesday, January 30, 2008*

*Last updated 12:59 a.m. PT*

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Government promises to rid the nation's food supply of brain-damaging pesticides aren't doing the job, according to the results of a yearlong study that carefully monitored the diets of a group of local children.

The peer-reviewed study found that the urine and saliva of children eating a variety of conventional foods from area groceries contained biological markers of organophosphates, the family of pesticides spawned by the creation of nerve gas agents in World War II.

When the same children ate organic fruits, vegetables and juices, signs of pesticides were not found.

"The transformation is extremely rapid," said Chensheng Lu, the principal author of the study published online in the current issue of *Environmental Health Perspectives*.

"Once you switch from conventional food to organic, the pesticides (malathion and chlorpyrifos) that we can measure in the urine disappears. The level returns immediately when you go back to the conventional diets," said Lu, a professor at Emory University's School of Public Health and a leading authority on pesticides and children.

Within eight to 36 hours of the children switching to organic food, the pesticides were no longer detected in the testing.

The subjects for his testing were 21 children, ages 3 to 11, from two elementary schools and a Montessori preschool on Mercer Island.

The community has double the median national income, but the wealth of Mercer Island made no difference in the outcome, he said.

"We are confident that if we did the same study in poor communities, we would get the same results," he said. The study is being repeated in Georgia.

The study has not yet linked the pesticide levels to specific foods, but other studies have shown peaches, apples, sweet bell peppers, nectarines, strawberries and cherries are among those that most frequently have detectable levels of pesticides.

## **Measuring the harm**

Lu is quick to point out that there is no certainty that the pesticides measured in this group of children would cause any adverse health outcomes. However, he added that a recent animal study demonstrated that persistent cognitive impairment occurred in rats after chronic dietary exposure to chlorpyrifos.

Death or serious health problems have been documented in thousands of cases in which there were high-level exposures to malathion and chlorpyrifos. But a link between neurological impairments and repeated low-level exposure is far more difficult to determine.

"There's a large underpinning of animal research for organophosphate pesticides, and particularly for chlorpyrifos, that points to bad outcomes in terms of effects on brain development and behavior," Dr. Theodore Slotkin, a professor of pharmacology and cancer biology at Duke University in North Carolina, said in the April 2006 *Environmental Health Perspectives*.

Lu says more research must be done into the harm these pesticides may do to children, even at the low levels found on food.

"In animal and a few human studies, we know chlorpyrifos inhibits an enzyme that transmits a signal in the brain so the body can function properly. Unfortunately, that's all we know."

Not many chemicals, including pharmaceutical products, were designed specifically to kill mammals, which was genesis of organophosphates.

"It is appropriate to assume that if we -- human beings -- are exposed to (this class of) pesticides, even though it's a low-level exposure on a daily basis, there are going to be some health concerns down the road," said Lu, who is on the Environmental Protection Agency's pesticide advisory panel.

The EPA says it eliminated the use of organophosphates on many crops and imposed numerous restrictions on the remaining organophosphate pesticide uses.

Congressional concern that children were being harmed by excessive exposure to pesticides led to the unanimous passage of the Food Quality Protection Act. At its heart was a requirement that by 2006, the EPA complete a comprehensive reassessment of the 9,721 pesticides permitted for use and determine the safe level of pesticide residues permitted for all food products.

"As a result, the amount of these pesticides used on kids' foods (has undergone) a 57 percent reduction," said Jonathan Shradar, the EPA's spokesman.

But that's not nearly enough to prevent birth defects and neurological problems, said Chuck Benbrook, chief scientist of the Organic Center, a nationwide, nonprofit, food research organization.

"The pesticide limits that EPA permits are far, far too high to say they're safe. And, the reduction that EPA cites in the U.S. has been accompanied by a steady increase in pesticide-contaminated imported foods, which are capturing a growing share of the market," he said.

Yet the EPA continues to insist that "dietary exposures from eating food crops treated with chlorpyrifos are below the level of concern for the entire U.S. population, including infants and children."

That statement is "not supported by science," Benbrook said.

"Given the almost daily reminders that children are suffering from an array of behavioral, learning, neurological problems, doesn't it make sense to eliminate exposures to chemicals known to trigger such outcomes like chlorpyrifos?" he asked.

## What to do

While the gut reaction of some parents might be to limit the consumption of fresh produce or switch completely to organic food, Lu cautions not to make the wrong decision.

"It is vital for children to consume significantly more fresh fruits and vegetables than is commonly the case today," he says, citing such problems as juvenile diabetes and obesity.

"Nor is our purpose to promote the consumption of organic food, although our data clearly demonstrate that food grown organically contains far less pesticide residues."

Lu says an all-organic diet is not necessary. He has two sons, 10 and 13, and he estimates that about 60 percent of his family's diet is organic.

"Consumers," he says, "should be encouraged to buy produce direct from the farmers they know. These need not be just organic farmers, but conventional growers who minimize their use of pesticides."

Understanding how fruits and vegetables grow can help guide the consumer, he says.

For example, organic strawberries probably are worth the money because they are a tender-fleshed fruit grown close to the dirt, so more pesticides are needed to fight insects and bugs from the soil. He adds apples and spinach to his list.

"It may also be money-smart to choose conventionally grown broccoli because it has a web of leaves surrounding the florets, resulting in lower levels of pesticide residue," Lu says.

He is greatly concerned about one finding from the study.

"Overall pesticide (marker) levels in urine samples were even higher in the winter months, suggesting children may have consumed fruits and vegetables that are imported. The government needs to ensure that imported food comply with the standards we impose on domestic produce," he said.

## Dangerous science

Chlorpyrifos, made by Dow Chemical Co., is one of the most widely used organophosphate insecticides in the United States and, many believe, the world.

For years, millions of pounds of the chemical insecticide were used in schools, homes, day care centers and public housing, and studies show that children were often exposed to enormously high doses. Just as the EPA was ready to ban the product, which analysts said would have

damaged Dow's overseas sales, the company "voluntarily" removed it from the home market. Yet, with few exceptions, the agricultural uses continued.

The EPA's Web site is a study in contradictions when it comes to chlorpyrifos.

At one section, it "acknowledged the special susceptibility and sensitivity of children to developmental and neurological effects from exposure to chlorpyrifos."

But in another section, the agency reports that infants and children face no risk from eating food crops treated with chlorpyrifos. However, the agency doesn't say how it reached that conclusion. There is no agreement of how much of the neurotoxin is too much.

Benbrook said the EPA has refused orders from Congress to study the cumulative developmental risk to children from low-dose exposures.

"Perhaps we can rest assured that EPA has protected us adults from acute insecticide poisoning risk, but our kids are on their own," Benbrook said.

## CONTAMINATED PRODUCE

A study by the Environmental Working Group analyzed results of nearly 51,000 tests for pesticides on fruits and vegetables conducted by the USDA and the FDA between 2000 and 2005. Contamination levels were measured in six different ways and crops were ranked on a composite score from all categories. Below are the foods listed by overall rank, worst to best, along with the results of two of the six criteria studied.\*

Rank	Produce	Percentage of samples tested with detectable pesticides	Maximum number of pesticides found on a single sample
1	Peaches	96.6%	9
2	Apples	93.6%	9
3	Sweet bell peppers	81.5%	11
4	Celery	94.1%	9
5	Nectarines	97.3%	7
6	Strawberries	92.3%	8
7	Cherries	91.4%	7
8	Lettuce	68.2%	9
9	Grapes, imported	84.2%	8
10	Pears	86.2%	6
11	Spinach	70.0%	6
12	Potatoes	81.0%	4

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11	Spinach	70.0%	6
12	Potatoes	81.0%	4
13	Carrots	81.7%	6
14	Green beans	67.6%	6
15	Hot peppers	55.0%	6
16	Cucumbers	72.5%	6
17	Raspberries	47.9%	6
18	Plums	74.0%	4
19	Oranges	85.1%	4
20	Grapes, domestic	60.5%	7
21	Cauliflower	84.6%	5
22	Tangerines	66.7%	3
23	Mushrooms	60.2%	5
24	Cantaloupe	53.3%	4
25	Lemons	55.6%	5
26	Honeydew melon	59.2%	4
27	Grapefruit	62.9%	4
28	Winter squash	41.3%	5
29	Tomatoes	46.9%	5
30	Sweet potatoes	58.4%	3
31	Watermelons	38.5%	4
32	Blueberries	27.5%	4
33	Papaya	23.5%	4
34	Eggplant	23.4%	4
35	Broccoli	28.1%	3
36	Cabbage	17.9%	3
37	Bananas	41.7%	2
38	Kiwi	15.3%	3
39	Asparagus	6.7%	2
40	Sweet peas, frozen	22.9%	2
41	Mangoes	7.1%	2
42	Pineapples	7.7%	2
43	Sweet corn, frozen	3.8%	1
44	Avocados	1.4%	1
45	Onions	0.2%	1

NOTE: Data and analysis considers how produce is typically washed and prepared before consumption.

\* The other four criteria not listed include: percentage of samples with two or more pesticides, average number of pesticides found, average amount of all pesticides found (in parts per million), and number of pesticides

of more pesticides, average number of pesticides found, average amount of all pesticides found (in parts per million), and number of pesticides found in the commodity in total.

Source: Environmental Working Group

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## ABOUT THE STUDY

Chensheng Lu's study was published this month in *Environmental Health Perspectives* ([ehponline.org](http://ehponline.org)), a publication of the National Institute of Environmental Health Science. It was funded by the Environmental Protection Agency and used federal laboratories to confirm the accuracy of his findings.

Unlike many previous studies, Lu's team focused on children living in an urban/suburban area who were tested for multiple days in each of the four seasons with urine and saliva sampled twice a day.

The organic produce was sent to the Department of Agriculture lab in Yakima to be tested for pesticides. The Centers for Disease Control and Prevention tested the urine samples and the Food and Drug Administration laboratory is completing its quantification of pesticide residues in samples of the conventional food the children consumed.

The team included scientists from Emory University, the CDC and the University of Washington.

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