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Comments on Preliminary Risk Assessment Document for Methyl Parathion

Summary

In January 1998, the Environmental Working Group called on the Environmental Protection Agency (EPA) to ban the insecticide methyl parathion in all foods consumed by children. We supported our recommendation with a detailed analysis of dietary risk of organophosphate exposure for children aged five and under.

One year later, we again call on the agency to ban this highly toxic pesticide, based on the results of a new, refined risk analysis.

Using state of the art monte carlo techniques and EPA's most recent acute toxicity factors, designed to protect consumers against immediate, short term damage to the nervous system, EWG found:

- An estimated 320,000 children between the ages of one and five years old eat an unsafe dose of methyl parathion in their food every day.
- More than 55,000 of those children exceed the safe dose of methyl parathion by a factor of ten or more each day, and 2,400 children ages one through five exceed the safe daily dose by more than 100-fold.
- Methyl parathion is so toxic that a five-year-old can not eat an apple with *any* detectable methyl parathion on it without being exposed to an unsafe dose of the pesticide. Some apples and peaches are so contaminated that just two bites (4 to 7 grams) are unsafe for children under age six. Any other organophosphate (OP) exposure in food, at home, at school, in water or in the air will only push that child's daily exposure to these compounds further into the zone that the EPA already considers unsafe. A vast literature compiled by the Agency makes clear that such exposures are a fact of daily life for children in the United States, and will continue until strong action is taken to severely restrict or ban a number of organophosphate insecticides now on the market.

We believe it is extremely unlikely that our estimates overstate exposure and risk. Our analysis uses the most recent verified data on food consumption from the USDA for the years 1994 through 1996, and residue data that were measured by the government after the foods were washed, cooked, and otherwise prepared for normal consumption.

The continued use of methyl parathion presents unacceptable, immediate health risks for hundreds of thousands of American children every day. This chemical would never be approved if it were newly submitted for registration today. It should have been taken off the market over a decade ago, averting literally millions of exposure-events in small children each year.

Methyl parathion is one of a number of pesticides that have rendered the American food supply unsafe due to the risks of pesticides for many years. By banning methyl parathion, the EPA will demonstrate that it is willing and able to take decisive action to protect children from those risks.

Background

In 1998, EWG released a report entitled *Overexposed: Organophosphate Insecticides in Children's Food* which evaluated the risks from combined exposure to organophosphates in food and called for an immediate ban on the food use of methyl parathion along with four other OPs (EWG 1998). The analysis in *Overexposed* calculated daily OP exposure in terms of a common toxic equivalent dose of OPs and then compared this dose to a chronic reference dose (RfD). More than one million children under age six exceed the chronic OP RfD each day. Since that time, EPA has decided to regulate combined OP exposure based on acute—not chronic—RfDs, and EWG has revised its analysis accordingly.

Methyl parathion is the most hazardous OP allowed in the U.S. food supply. It is a potent neurotoxic agent that kills bugs by disrupting vital transmitters in their nervous systems. The pesticide works the same way in people.

EPA scientists have set the maximum safe daily exposure level, or acute reference dose for methyl parathion at 0.000025 milligrams per kilogram of body weight, the lowest of all the widely-used pesticides. This RfD incorporates the traditional 100-fold inter- and intra-species safety factors, plus the full additional 10-fold safety factor to protect children required by the 1996 Food Quality Protection Act (FQPA).

Methyl parathion presents a serious risk to infants and children. It is a category 1 acute toxin (the most dangerous classification) by oral, dermal, and inhalation exposure. Peer-reviewed studies in the open literature show that methyl parathion is more toxic to fetal and newborn rats than mature rats. Additional studies show that exposure during critical developmental periods can cause permanent behavioral damage. For example, in one study a single exposure in the rat caused peripheral nerve demyelination, and chronic exposure at relatively low doses caused retinal degeneration and sciatic nerve degeneration (EPA 1998a).

On two separate occasions, first in December of 1997, and then again in June of 1998, internal EPA peer reviews supported application of the full 10-fold FQPA safety factor to the RfD for methyl parathion based on evidence of increased toxicity to young animals.

According to agency documents:

“Specifically for chlorpyrifos and methyl parathion, in studies conducted at various scientific laboratories and reported in the open literature, neuropathology was observed in animals and/or humans and evidence of increased susceptibility was seen in prenatal developmental toxicity studies in rats following oral, subcutaneous and/or intraperitoneal administrations.” (EPA 1998b)

EWG has argued throughout 1998 for a ban on methyl parathion. The analysis below reaffirms the need for the ban.

America’s Children at Risk

On December 18, 1998, EPA released for public comment a first tier risk assessment for the insecticide methyl parathion. At that time the agency estimated that children would exceed the safe daily dose of methyl parathion exposure by more than 100-fold. Cheminova, the company that produces most of the methyl parathion sold in the United States, criticized the Agency’s tier-one risk assessment and requested a more “realistic” analysis (Cheminova 1998).

As comments on the agency’s first tier assessment, the Environmental Working Group presents the results of a more sophisticated analysis below, focusing on the risk faced by children one through five years of age. The analysis is based on the most accurate and recent food consumption and food residue data publicly available today. Notably, it confirms the basic findings of the EPA analysis, that substantial numbers of children exceed agency safety margins for methyl parathion by a factor of 100 or more each day.

The data and methods used are basically those described in *Overexposed* (EWG 1998). Briefly, our analysis uses food consumption data from the U.S. Department of Agriculture’s Continuing Survey of Food Intake by individuals for the years 1989 through 1991 and 1994 through 1996. These surveys reported food consumption by 4,632 children that yielded 9,413 validated eating days for children age one through five years of age after USDA researchers confirmed the results by telephone. Data on pesticide residues in food came from the results of over 110,000 government tests, including 40,000 samples collected and analyzed by USDA’s Pesticides Data Program (1992 -1997), 67,000 samples analyzed under the FDA’s Pesticide Monitoring and Surveillance Program (1992 - 1997) and 4,250 samples from the Total Diet Study (1991 - 1996). All non-detects, or samples with zero residues, were included in the analysis. Samples in the Pesticide Data Program and the Total Diet Study were washed, peeled, cooked and prepared the way that a person would prepare foods home. Residue reduction factors of from 25 to 90 percent were applied to the FDA monitoring data whenever they were used. The analysis simulated dietary exposure to methyl parathion in 4.5 million eating days for children ages one through five. Total methyl parathion exposure was then compared to the EPA acute reference dose of 0.000025 mg/kg/day.

Our analysis may underestimate risk in one important way. All of the residue data described above are based on analysis of composite samples of foods. For foods eaten individually, such as many fresh fruits and vegetables treated with methyl parathion, composite sample results like those used here can substantially dilute the residues and risks from eating the “hot” apple in the ten-pound slurry tested. This is important because methyl parathion presents an acute risk that can occur from a single eating event.

Table 1. More than 320,000 children ages 1 through 5 eat an unsafe dose of methyl parathion each day.

Age	Children exceeding the safe dose/day	Children exceeding the safe dose by a factor of 10/day
5	64,390	9,450
4	56,870	8,950
3	69,360	12,810
2	63,780	12,010
1	70,180	12,300
Total	324,580	55,520

Recently published data from the USDA showed that residues of the highly toxic bug killer aldicarb on individual potatoes were up to 7

times higher than the results of a ten-pound slurry of the same potatoes (USDA 1999). In a 1997 study, the Ministry of Agriculture and Fisheries in Great Britain found that levels of pesticide residues in individual fruits and vegetables could vary from their composites by as much as a factor of 29, and often by more than a factor of ten (Pesticides Safety Directorate 1997). The only data on methyl parathion available in that report show that methyl parathion residues were 5 times higher on individual oranges than in composite tests of the same oranges. Our analysis relies solely on composite samples and does not account for potentially higher methyl parathion residues in individual foods.

Source: Environmental Working Group compiled from U.S. government data.

Results

According to EWG’s analysis, 324,000 children between the ages of one and five exceed the reference dose for methyl parathion exposure every day (Table 1). To illustrate the point, this means that every day a population equal to all the one-through-five-year-olds in Minnesota eat an unsafe dose of methyl parathion. Any other OP exposure in food, at home, at school, in water or in the air will only push that child’s daily exposure to OPs further into the zone that the EPA already considers unsafe. Just over 55,000 children exposed to methyl parathion exceed the safe dose by a factor of 10, and 2,400 exceed it by a factor of 100. The child who ate the most methyl parathion per kilogram of body weight was a three-year-old who ate a dose that was more than 750 times the EPA’s safe daily dose.

Nearly one-half of the children ages one through five who eat methyl parathion every day eat an unsafe dose of the compound (324,000 of the 705,000 exposed children). Put another way, if there’s any methyl parathion in a child’s food, there is about a 50-50 chance that the child is getting an unsafe dose. Almost 8 percent of the kids who eat methyl parathion in their food go over the safe limit by a factor of 10 or more. A five-

Table 2. Apples and peaches account for most of the unsafe methyl parathion exposure each day.

Food	Children exceeding the safe dose of methyl parathion/day
Apples	146,830
Peaches	60,330
Applesauce	54,960
Grapes	12,330
Pears	10,170
Nectarines	9,290
Apple Juice	9,110
Pears (baby food)	6,570
String beans	4,060
Raisins	2,640
Plums	1,650
Strawberries	1,460
Peaches (baby food)	1,340

Source: Environmental Working Group compiled from U.S. government data.

greatest risk (caused children to exceed the RfD by the greatest amount) were grapes and peaches. Grapes appear to be unique among high-risk foods. Seventy (70) percent of the children who got an unsafe dose of methyl parathion eating grapes, exceeded the safe dose by a factor of ten or more (Table 3). This is quite different than the apples, peaches, and pears, where just 11 to 36 percent of children exposed to an unsafe dose exceeded the RfD by a factor of ten or more. Ninety-two (92) percent of the top 100 most exposed children in our analysis were exposed to methyl parathion via grapes.

Virtually any dose of methyl parathion is unsafe for children. Apples and

year-old child cannot eat a whole apple or 95 percent of the peaches on the market that have any detectable level of methyl parathion on them, without eating an unsafe dose of the compound.

The foods that exposed the greatest number of children to an unsafe dose of methyl parathion were apples, applesauce, and peaches (Table 2). These three foods, derived from two crops, account for 80 percent of the unsafe methyl parathion exposures each day. About 19 percent of all peaches and 2 percent of all apples, pears and grapes have such a potent dose of methyl parathion on them (after washing by federal technicians) that the equivalent of eating 4 grapes (20 grams) will expose a one-year-old to an unsafe daily dose of the pesticide.

The foods that put children at the

Table 3. Two out of every three unsafe methyl parathion exposures via grapes exceed the safe daily dose by a factor of ten or more.

Food	Number of exposures ten times the safe daily dose (children ages 1 through 5)	Percent of unsafe exposures that are more than ten times the safe daily dose
Grapes	8,750	70%
Peaches	22,030	36%
Nectarines	2,840	30%
Pears	2,540	25%
Apples	16,660	11%

Source: Environmental Working Group compiled from U.S. government data.

apple products put huge numbers of children at risk because they are consumed by large numbers of children. Eating grapes exposed children to the highest doses of methyl parathion because it is more common for children to eat a large amount of grapes over the course of a day than it is to eat a large volume of apples.

Methyl parathion exposure is concentrated in just a few foods that are important sources of nutrition for young children. There is no reason why there should be a trade-off between good nutrition and the risk of eating a highly toxic insecticide. Methyl parathion should be banned.

Conclusions and Recommendations

Methyl parathion is unsafe for children at virtually any dose and must be banned for use immediately on all foods.

This insecticide is a relic of an era when highly toxic chemistry was the objective, and when our knowledge of the health risks of pesticides in general, and neurotoxic compounds in particular, was minimal. Now we know that the brains and nervous systems of infants and children are extremely vulnerable to neurotoxic substances. Yet with the notable exceptions of lead and perhaps methyl mercury, federal toxics and pesticide policy has not produced any decisive actions indicating that the government is serious about protecting children from neurotoxic contaminants in the environment.

Methyl parathion is a pivotal decision for the EPA. By banning this one pesticide, the agency can eliminate a substantial portion of the neurotoxic risk from organophosphate insecticides in the food supply. Further, the agency would send a signal that it is serious about protecting children, and that it will act decisively to remove OPs and other neurotoxic threats from the environment in order to do so.

If the EPA decides to protect America's children and cancel all food uses of methyl parathion, it will join 27 other countries across the globe who have already banned it or never registered it in the first place (Table 4). These countries include developing nations like Indonesia and the Philippines as well as developed nations like Canada, the United Kingdom, and Denmark—where Cheminova, the largest manufacturer of methyl parathion sold in the United States, is located.

Table 4. Over 25 countries have either banned methyl parathion or do not have it registered for use.

Countries where methyl parathion is banned	Countries where methyl parathion is not registered for use
Argentina	Belize
Bangladesh	Canada
Benin	Cuba
Bulgaria	Denmark
Dominican Republic	Finland
Ecuador	Hong Kong
Egypt	Japan
Indonesia	Korea
Ireland	Madagascar
Jamaica	Poland
Jordan	Sweden
Philippines	United Kingdom
Sri Lanka	Zimbabwe
Yemen	

Source: Pesticide Action Network, North America (PANNA). *Demise of the Dirty Dozen*. <http://www.panna.org/panna/campaigns/DD.html>.

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