



Summaries of Controversial Chlorpyrifos Research

If you are a grower or farm association confronted with allegations against chlorpyrifos supported by these studies, the following summaries might help you evaluate these allegations.

Duke University Injection Studies

For the past decade, researchers at Duke University have been exploring what physiological effects, other than inhibition of cholinesterase, might be caused by exposures to chlorpyrifos. Among other things, these researchers have reported that using hypodermic needles to inject chlorpyrifos at relatively high doses into the brain and body cavities of newborn rat pups affects the development of their nervous system, as well as causing other subtle effects. Problems with this research include:

- Rats were injected with chlorpyrifos at levels thousands of times above real-world exposures.
- Injection of chlorpyrifos has little to do with real-world exposures.
- In order to inject chlorpyrifos into the bodies of rats, researchers diluted the product in a solvent. Unfortunately, the particular solvent they used, dimethylsulfoxide (or DMSO) has documented toxic properties of its own.

Columbia University Study of Birth Weight and Childhood Development

Researchers at Columbia University reported that exposure to chlorpyrifos prior to birth can be linked to decreased body length and weight at birth and to later childhood developmental issues. Findings from this study run contrary to the vast body of research on chlorpyrifos. The problems with this research include:

- Researchers at Mount Sinai Hospital and the University of California at Berkeley conducted similar studies. They did not show a link between chlorpyrifos and birth size or later development.
- Chlorpyrifos exposures measured were more than 4,000 times below the dose shown to cause no effect in rats, the most sensitive species of laboratory animal.
- Children with “low” exposure to chlorpyrifos actually had **higher** developmental test scores than those with no exposure. This result calls into question the idea that exposure to chlorpyrifos affected test scores.
- Test scores from the research showed that about one-third of all children in this inner city population had cognitive and developmental delays, regardless of whether or not the researchers considered them exposed to chlorpyrifos. This suggests that the real cause of the differences in test scores may be caused by other environmental or sociological factors.

The Agricultural Health Study

This is actually a cluster of studies begun in 1993 by several federal agencies, The Agricultural Health Study looks at various factors affecting the health of farmers and farm workers. In 2004, researchers for The Agricultural Health Study reported a survey of 57,284 pesticides applicators in Iowa and North Carolina in which 50 different pesticides were evaluated as potential causes of lung cancer.

Based on these comparisons, users of seven of the pesticides were reported to have higher rates of lung cancer than those of their peers who had not used them. Of these seven pesticides, four (chlorpyrifos, diazinon, metolachlor and pendimethalin) were reported to have increasing prevalence of lung cancer risk associated increasing estimated use of the product.

Problems with this study include:

- Of the applicators in this study who had lung cancer, **95 percent** were tobacco smokers. Of the 71 applicators with lung cancer reporting exposure to chlorpyrifos, **all but four** were smokers.

- An increased chance of lung cancer was only reported among workers using chlorpyrifos more than 116 days in their life. The base size of this group was too small for the findings to be statistically significant.
- Amount of pesticide use was self-reported. Previously, when this group of applicators was asked on two different occasions how many years and how many days per year they had used particular pesticides, they were only able to provide the same answer about *half* the time.
- Animal studies have never demonstrated that chlorpyrifos causes cancer, even at doses thousands of times greater than real-world exposures.