Health Effects of Acute and Chronic Chlorpyrifos Exposure

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Overview

• Health effects of acute exposure
• Acute exposures in Oregon
• Health effects of chronic exposure
• How we know what we know
Health Effects of Acute Exposure to Chlorpyrifos

- Headaches
- Blurred vision, watering of the eyes,
- Excessive salivation
- Runny nose
- Dizziness
- Confusion
- Muscle weakness or tremors
- Nausea and diarrhea
- Sudden changes of heart rate
- Severe sweating
- Loss of bowel control
- Seizures
- Loss of consciousness
- Death
Confirmed Acute Exposures in Oregon

Includes only cases that:
• Were reported to state agencies, and
• Had evidence that exposure occurred, and
• Had at least two symptoms consistent with exposure
Health Effects of Chronic Exposure to Chlorpyrifos - Adults

- Loss of peripheral nerve function (organophosphates)
- Poorer performance on neurological function tests (specific to chlorpyrifos) - termite pesticide applicators
- Headache, fatigue, insomnia, tension, irritability, dizziness, depression and numbness in the hands and feet (organophosphates) – Farm workers
- Exacerbation of asthma (Chlorpyrifos) – farm workers
Health Effects of Prenatal Exposure to Chlorpyrifos - Children

- Mental delay
- Psychomotor delay delay
- Attention disorders
- ADHD
- Pervasive developmental disorders
How We Know What We Know

- Observed neurodevelopmental effects in:
  - Epidemiological studies in exposed humans
  - Animal studies
Human studies

• EPA’s 2016 Risk Assessment
  – Comprehensive literature review
  – 3 high quality epidemiological studies
  – 7 supporting epidemiological studies
3 Epidemiological Studies Are High Quality Because:

- Prospective cohort studies
- Biomarkers of exposure as well as exposure history
- Consistency in findings across different populations using similar standardized exposure and outcome measures
- Strength of the associations found
- Objective measures of exposure and standardized, validated measures of outcomes
3 Epidemiological Studies Are High Quality Because: (Continued)

• Control for multiple confounding variables
• Dose-response effect (i.e. higher dose = stronger effect)
• Minimized chance for bias in assessing outcomes (people testing outcomes didn’t know exposure history)
• Attempts to assess genetic pre-dispositions to effects
Animal studies

• California EPA’s 2018 Risk Assessment
  – 5 animal studies showing neurodevelopmental toxicity relevant to findings in human epi studies
EPA 2016 Risk Assessment Findings

• Current regulations and label restrictions are not adequately protective of public health
  – All occupational/applicator scenarios showed unacceptable risk even using maximum personal protective equipment requirements on the label
  – Occupational re-entry intervals were mostly at least 18 days to avoid unacceptable risk
  – All spray application scenarios showed that even a 300 foot buffer posed unacceptable risk due to drift
  – Existing food tolerances showed unacceptable risk for all populations analyzed with 1-2 year old children having the highest risk.
  – Golfers exposure scenarios showed unacceptable risk
California EPA 2018 Risk Assessment

Findings

- Current regulations and label restrictions related to foliar applications are not adequately protective of public health (Did not evaluate non-spray applications to soil)
  - Spray application showed unacceptable risk due to drift for any exposed population closer than ¼ mile downwind of application area.
  - Dietary and drinking water scenarios showed unacceptable risk for sensitive populations
  - Combined spray drift and dietary/drinking water scenarios all showed unacceptable risk.
Overall Summary

Existing regulations and label instructions may not be adequately protective of the neurodevelopmental health effects observed in epidemiological and animal studies.