Pesticide Exposure, Intelligence and Children: Preliminary Results

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Center for Rural Health

- Established in 1980, at the University of North Dakota School of Medicine and Health Sciences in Grand Forks, ND
- Focuses on:
  - Education, Training, & Resource Awareness
  - Community Development & Technical Assistance
  - Native American Health
  - Rural Health Workforce
  - Rural Health Research
  - Rural Health Policy
- Web site: http://medicine.nodak.edu/crh
What are Pesticides?

- Herbicides
- Insecticides
- Rodenticides
- Fungicides
Pesticide Exposure and Children

A Summary of Recent Findings on Birth Outcomes and Developmental Effects of Prenatal DDT, DDE, and Pesticide Exposure

Children’s Health Criteria

Concentrations of Environmental Chemicals Associated with Neurodevelopmental Effects in U.S. Population

Neurobehavioral Performance in Preschool Children from Agricultural and Non-Agricultural Communities in Oregon and North Carolina

Pesticide Exposure and Cognitive Ability in Children
Objectives of Current Study

1. Examine the impact of chronic routine exposure to pesticides on cognitive and motor performance in children between 7 and 12 years of age, including memory performance, executive function performance, motor performance, and performance on school-related achievement tests.

2. Measure the concentration of several pesticides and cholinesterase in the blood or urine in children between 7 and 12 years of age and examine associations between pesticide and cholinesterase concentration and cognitive and motor performance.

Red River Valley
Pesticides in North Dakota

Participants

Pesticide Group = 64 children and their parents living on or next to an active farm or field

Control Group = 64 Children and their parents living at least one mile from an active farm or field
Measurements - Children

Physiological

Height and Weight
Blood and Urine - pesticides, cholinesterase, trace minerals

Motor

Grooved Pegboard Test
Benton Visual Retention Test
Finger Tapping Test
Hand-eye Coordination Test

Cognitive

Wechsler Intelligence Scale for Children-IV
California Verbal Learning Test for Children
Verbal Fluency Test
Continuous Performance Test
Wisconsin Card Sorting Test
Wechsler Individual Achievement Test- 2nd ed- Reading & Listening Comprehension

Measurements - Parents

Cognitive

Wechsler Adult Intelligence Scale-III
Vocabulary & Block Design

Behavioral

Child Behavior Checklist
ADHD Rating Scale-IV

Nutritional Status

NIH Diet History Questionnaire
Food Security module
24-Hour Dietary Recall

Developmental

Tanner Pubertal Development Test
Developmental Milestones

Environmental

Pesticide use and exposure questionnaire
Surveys on family and child medical history, sleep, occupation, income, education level
Measurements - Teachers

Behavioral

Teacher Report Form for Child Behavior Checklist
Teacher Report Form for ADHD Rating Scale-IV

Preliminary Results
Verbal Comprehension Scores

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<th>Component</th>
<th>Pesticide</th>
<th>Control</th>
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<td>Comprehension</td>
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<td>Vocabulary</td>
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Perceptual Reasoning Scores

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<tr>
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Working Memory Scores

- Letter-Number Sequence:
  - Pesticide: 9.7
  - Control: 10.54

- Digit Span:
  - Pesticide: 9.69
  - Control: 9.66

Processing Speed Scores

- Symbol Search:
  - Pesticide: 9.61
  - Control: 10.54

- Coding:
  - Pesticide: 8.72
  - Control: 8.55
Parents Estimated Full Scale IQ

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Exposure Reduction Strategies

- Get information:
  - National Pesticide Information Center at [http://npic.orst.edu](http://npic.orst.edu)
• Co-exist by using universal precautions and preventing contact between chemicals and children.
  – Removing clothing and shoes that have been exposed prior to entering house.
  – Don’t wash exposed clothes with children’s.
  – Wear protective equipment during application.

• Replace chemicals with safer ones or use toxic chemicals as a last resort.
  – Use LPM strategies to reduce overall pesticide use.
  – Use the lowest level of DEET spray or an alternative for use as a mosquito repellent on children.
Follow manufacturer’s instructions to help reduce overall exposure.

- How long after application before children/pets/adults should be on lawn or in field?
- Where should you apply mosquito repellent and how long should it stay in contact with skin?

For more information contact:

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University of North Dakota
School of Medicine and Health Sciences
Grand Forks, ND 58202-9037

Tel: (701) 777-3848
Fax: (701) 777-6779

http://medicine.nodak.edu/crh

Connecting resources and knowledge to strengthen the health of people in rural communities.