

New study links autism to pesticides

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A worker sprayed pesticides in the Hawaiian Commercial & Sugar Company sugar cane field on Maui.

FRESNO, Calif. » A new study released Monday suggests that pregnant women who live near agricultural fields where pesticides are sprayed are at increased risk of having a child with autism.

The study by the University of California, Davis, MIND Institute found mothers exposed to organophosphates had a two-thirds increased risk of having a child with autism.

And the risk was strongest when exposures occurred during the second and third trimesters of pregnancies, the research showed.

UC Davis is not the first to report a possible link between autism and agricultural pesticide exposure. Seven years ago a study based in California's Central Valley showed an association — and the UC Davis researchers said their results strengthen the evidence and warrant caution.

Families living close to agricultural fields may want "to leave town or keep their children away or close the windows" on days when pesticides are being applied, said Dr. Irva Hertz-Picciotto, senior author of the report and professor and vice chair of the Department of Public Health Services at UC Davis.

UC Davis said the study, published online Monday in "Environmental Health Perspective," used commercial pesticide application data from the California Pesticide Use Report, which shows what pesticides are applied, and where and when they are applied.

Using the pesticide data maps, researchers overlaid addresses of about 1,000 participants in a Childhood Autism Risks from Genetics and Environment study — a population-based, case-control study of children ages 2-5 with

autism, developmental delay and typical development. The study area primarily was within a two-hour drive of Sacramento.

About one-third of the mothers in the study lived within 1.5 kilometers — just under a mile — of an agricultural pesticide application when they were pregnant, the researchers said.

The risk of autism decreased the farther the pregnant women lived from where pesticides were sprayed, the report said.

The research included four classes of pesticides: organophosphates, organochlorines, pyrethroids and carbamates. The pesticides are used on a variety of crops in the Valley, such as cantaloupe, melon, oranges, tomato processing, cotton and alfalfa.

About 1.7 million pounds of the pesticides were applied in Fresno, Madera, Kings, Tulare and Merced counties in 2012, the latest data available, said Charlotte Fadipe, a spokeswoman at the California Department of Pesticide Regulation.

According to the study, the spraying of organophosphates while a woman was pregnant was linked to an elevated risk of autism, particularly the application of the pesticide chlorpyrifos in the second trimester and organophosphates in the third trimester.

Pyrethroids also were associated with autism and developmental delay prior to conception or in the third trimester. Carbamates sprayed nearby while a woman was pregnant were associated with developmental delay, the study said.

Autism, a developmental disorder, is characterized by varying degrees by difficulty in social interaction, verbal and nonverbal communication, and repetitive behaviors or movements. About 1 in 68 children in the United States has an autism spectrum disorder, according to the federal Centers for Disease Control and Prevention.

There is no known cause for autism, but environmental factors have been one focus of study for the past several years.

A 2007 study by the California Department of Public Health found children born to mothers who had been exposed to two organochlorine pesticides during their first trimester of pregnancy were six times more likely to develop autism than a control group whose mothers did not live near fields.

State health officials cautioned at the time that small numbers of children were involved in the study and that further research was needed. UC Davis researchers cited the state study and said their evidence supports findings that link autism spectrum disorder to agricultural pesticide exposure.

Paul Towers, spokesman for Pesticide Action Network North America, a San Francisco-based advocacy group, said the UC Davis study should prompt state and federal officials to take more aggressive action to reduce pesticide use.

Fadipe of the state Department of Pesticide Regulation said scientists in the department had not been able to fully review the UC Davis report, but she said it is a "useful tool for the department to take into consideration."

The report, like others, has shortcomings, Fadipe said. It doesn't provide an accurate sense of whether the exposure actually occurred and whether the exposure resulted in autism.

Researchers said the study has limitations that were unavoidable, including not knowing all of the potential sources of exposure to pesticides from non-agricultural sources, such as on food sources and from residential indoor use of chemicals and outdoor use for pest control.

Although more research needs to be done to learn how pesticides might influence brain development, it's clear that most are neurotoxic, the researchers said. "A number of pesticides impact the balance of neuro-excitation and neuro-inhibition" that control mood, learning, social interactions and behavior, UC Davis' Hertz-Picciotto said.

Charles Genseal of Madera said he doesn't know if pesticides are a factor in autism. He has a granddaughter,

13, who has Rett syndrome, a form of autism, and she never has lived near a farm.

Pesticide exposure could be "just one more thing, in a long, long list of things" that could be causing autism, Genseal said. "I pray for the day that we pin it down."

But, Hertz-Picciotto said, the process that pesticides use to kill insects "is also a process that is shared with mammals and with human beings, and I think that makes them something we should think twice about exposing ourselves to."

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Neurodevelopmental Disorders and Prenatal Residential Proximity to Agricultural Pesticides: The CHARGE Study

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Abstract

Background: Gestational exposure to several common agricultural pesticides can induce developmental neurotoxicity in humans, and has been associated with developmental delay and autism.

Objectives: To evaluate whether residential proximity to agricultural pesticides during pregnancy is associated with autism spectrum disorders (ASD) or developmental delay (DD) in the Childhood Autism Risks from Genetics and Environment (CHARGE) Study.

Methods: The CHARGE study is a population-based case-control study of ASD, developmental delay (DD), and typical development. For 970 participants, commercial pesticide application data from the California Pesticide Use Report (1997-2008) were linked to the addresses during pregnancy. Pounds of active ingredient applied for organophosphates, organochlorines, pyrethroids, and carbamates were aggregated within 1.25km, 1.5km, and 1.75km buffer distances from the home. Multinomial logistic regression was used to estimate the odds ratio (OR) of exposure comparing confirmed cases of ASD (n = 486) or DD (n = 168) with typically developing referents (n = 316).

Results: Approximately one-third of CHARGE Study mothers lived, during pregnancy, within 1.5 km (just under one mile) of an agricultural pesticide application. Proximity to organophosphates at some point during gestation was associated with a 60% increased risk for ASD, higher for 3rd trimester exposures [OR = 2.0, 95% confidence interval (CI) = (1.1, 3.6)], and 2nd trimester chlorpyrifos applications: OR = 3.3 [95% CI = (1.5, 7.4)]. Children of mothers residing near pyrethroid insecticide applications just prior to conception or during 3rd trimester were at greater risk for both ASD and DD, with OR's ranging from 1.7 to 2.3. Risk for DD was increased in those near carbamate applications, but no specific vulnerable period was identified.

Conclusions: This study of ASD strengthens the evidence linking neurodevelopmental disorders with gestational pesticide exposures, and particularly, organophosphates and provides novel results of ASD and DD associations with, respectively, pyrethroids and carbamates