

# Agricultural Pesticides Linked to Autism and Other Neurodevelopmental Disorders

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The following text is the Abstract of a detailed scientific study by Environmental Health Perspectives

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**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.

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