Effects of developmental pesticide exposure on Folate metabolism pathway in prairie voles as a model of neurodevelopmental disorders

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Keywords: Neurodevelopmental Disorders, Folate Metabolism Pyrethroids, Prairie Voles

Published: 22 November 2024

The study investigates the relationship between pesticide exposure and the risk of neurodevelopmental disorders (NDDs) such as autism spectrum disorder and attention deficit hyperactivity disorder. This is in the context of both environmental and genetic factors contributing to NDDs. Deltamethrin, a type II pyrethroid, is identified as a significant concern due to its extensive global use in agriculture, and household insect control. The focus is on the potential impact of developmental pesticide exposure (DPE) on pregnant women and the subsequent risk of their children being diagnosed with autism or other NDDs.

The primary objective of the research is to explore the effects of developmental exposure to low doses of deltamethrin on brain function and behavior in mice and prairie voles. The study aims to understand how developmental exposure affects the offspring of these animals, particularly looking at behavioral changes relevant to NDDs. A key aspect of the study is to evaluate whether supplementation with a folate vitamer (5-methyl tetrahydrofolate) during the exposure period could reduce negative impacts of DPE.

To achieve these objectives, the study employed a methodology involving the exposure of female prairie voles to low doses of deltamethrin during crucial developmental periods, namely pregnancy and lactation. This exposure was administered both with and without the addition of a folate vitamer supplement. The adult offspring of the

exposed mothers were then subjected to a battery of behavioral tests to identify changes, focusing on aspects relevant to NDDs such as cognitive function, repetitive behaviors, and locomotor (circadian) patterns.

The findings from this study revealed that exposure to DPE resulted in noticeable changes across four behavioral domains closely associated with NDDs. These included hyperactivity, cognitive deficits, alterations in repetitive behaviors, and disruptions in circadian rhythms. However, it was also observed that the supplementation of folate during the exposure period helped in reducing the deficits in cognition and circadian rhythms, though it had no effect on repetitive behaviors.

Conclusively, the study demonstrates that developmental exposure to deltamethrin adversely affects behaviors relevant to NDDs across multiple domains. The research also suggests that folate supplementation may have a potential role in xenobiotic detoxification, particularly those linked to NDDs. However, the effectiveness of folate supplementation appears to vary across different behavioral domains, indicating a need for further research in this area.

