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Adolescent Intermittent Alcohol Exposure Alters Pain Related Behaviors and Anxiety-like Responses in Mice

Introduction: Adolescence is a critical period for proper brain development. Adolescent alcohol consumption can lead to long-term changes in brain development, such as a higher risk of developing alcohol use disorder (AUD). There is a bidirectional relationship between alcohol use and pain. Previous studies find that adolescent intermittent ethanol (AIE) vapor exposure induces persistent mechanical hypersensitivity in both male and female mice, while producing sex-specific differences in thermal hypersensitivity and negative affect-like behaviors during adulthood. The goal of this study is to look at the effect of AIE on pain and anxiety-related behaviors in adult mice that underwent AIE.

Materials and Methods: Male and female C57BL/6J mice were either exposed to air or AIE between post-natal day 29-38. AIE involves two 4-day cycles of exposure to either ethanol or water vapor for 16 hours followed by 8 hours out of the chamber for four days. Between each four-day cycle there is a three-day break of no vapor exposure. Following vapor exposure, the mice underwent four weeks of behavioral testing. The mice underwent the acetone and marble burying tests in weeks 1 and 3 post-vapor and dry ice and sucrose tests and weeks 2 and 4 post-vapor. Acetone and dry ice testing are both measures of thermal sensitivity whereas the marble burying test and the sucrose spray test are measures of negative affect-like behaviors in mice.

Results: No significant results were found for the dry ice, marble burying, or sucrose spray tests. For acetone testing, a significant difference was seen in week one where AIE females were less sensitive than air controls and AIE males showed increased sensitivity than male controls. In week 2 of acetone, males remained more hypersensitive than controls, but no difference was observed in females.

Conclusion: The phenotypic expression of AIE-mediated changes is seemingly complex. Future directions should include additional behavior testing.