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Presenter Information

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The effects of moderate prenatal alcohol exposure on the organization of exploratory behavior by adult rats

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Abstract:

A large body of research has indicated that moderate prenatal alcohol exposure (PAE - 60 mg/dl peak blood alcohol content) can produce subtle impairments on cognitive processes, such as spatial learning and memory (Savage et al., 2010). The neurobiological basis of these impairments is poorly understood but may be linked to alterations in hippocampal functioning. Although the hippocampus has a central role in learning and memory, damage to the hippocampus can also produce impairments in locomotor and exploratory behaviors by rodents (Thompson et al., 2018). Rodent exploratory behavior is organized around home bases, which serve as central points of attraction from which animals organize their exploratory excursions into the remaining environment. Although rats can express home bases in featureless environments and in darkness, they are typically established near prominent environmental cues. Given the evidence of impaired spatial memory in PAE rats, we sought to test the hypothesis that exploratory behaviors are disrupted after moderate prenatal alcohol exposure. In the present study, we utilized an established rat model of moderate prenatal alcohol exposure (Davies et al., 2018). Adult PAE and saccharin (SACC) control rats were allowed to freely explore a circular open field (5 ft dia) for ~30min. Animals were tested in two conditions: a dark test in which the room lights were turned off and a lighted condition in which the room was illuminated. We specifically predicted that PAE rats would express disrupted home base establishment in the absence of visual cues (i.e., the dark condition), similar to what is observed in hippocampal lesioned animals (Hines & Whishaw, 2005). Our results indicated that PAE rats were able to establish home bases within the first 5 minutes of exploration under both light and dark conditions. Furthermore, exploratory behaviors, such as excursions to and from the home base, stops within the home base, total distance traveled, and grooming were also observed to be similar to that of SACC controls. These results indicate that rats exposed to moderate levels of alcohol prenatally are able to organize their exploratory behavior around home base locations. While this pattern of behaviors may indicate that moderate PAE does not impair the gathering of spatial information from a novel environment, future studies are needed to determine whether spatial information is retained after exploratory behavior.