

Perinatal Ethanol Exposure Modifies CART System in Rat Brain Anticipated for Development of Anxiety, Depression and Memory Deficits

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Abstract : Ethanol ingestion by the mother ensue adverse consequences for her offspring. Herein, we examine the behavioral phenotype and neural substrate of the offspring of the mother on ethanol. Female rats were fed with ethanol-containing liquid diet from 8 days prior of conception and continued till 25 days post-parturition to coincide with weaning. Behavioral changes associated with anxiety, depression and learning and memory were assessed in the offspring, after they attained adulthood (day 85), using elevated plus maze (EPM), forced swim (FST) and novel object recognition tests (NORT), respectively. The offspring of the alcoholic mother, compared to those of the pair-fed mother, spent significantly more time in closed arms of EPM and showed more immobility time in FST. Offspring at the age of 25 and 85 days failed to discriminate between novel versus familiar object in NORT, thus reflecting anxiogenic, depressive and amnesic phenotypes. Neuropeptide cocaine- and amphetamine-regulated transcript peptide (CART) is known to be involved in central effects of ethanol and hence selected for the current study. Twenty-five days old pups of the alcoholic mother showed significant augmentation in CART-immunoreactivity in the cells of Edinger-Westphal (EW) nucleus and lateral hypothalamus. However, a significant decrease in CART-immunoreactivity was seen in nucleus accumbens shell (AcbSh), lateral part of bed nucleus of the stria terminalis (BNSTl), locus coeruleus (LC), hippocampus (CA1, CA2 and CA3), and arcuate nucleus (ARC) of the pups and/or adults offspring. While no change in the CART-immunoreactive fibers of AcbSh and BNSTl, CA2 and CA3 was noticed in the 25 days old pups, the CART-immunoreactive cells in EW and paraventricular nucleus (PVN), and fibers in the central nucleus of amygdala of 85 days old offspring remained unaffected. We suggest that the endogenous CART system in these discrete areas, among other factors, may be a causal to the abnormalities in the next generation of an alcoholic mother.

Keywords : anxiety, depression, CART, ethanol, immunocytochemistry

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