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Effect of adolescent intermittent alcohol exposure on the expression of hypoxia inducible factors in the rat brain at adolescence and adulthood

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Adolescent alcohol use is widely practiced at great personal and societal costs, including a prolonged vulnerability to mood disorders and alcoholism. It is unknown how this environmental insult during development produces lasting neurobiological changes, chronically predisposing one to psychopathology. Hypoxia inducible transcription factors (HIF) regulate brain development and may mediate effects of repeated alcohol exposure during adolescence. Alcohol's effect on hypoxia pathways in the brain is unknown. This study aimed to characterize the changes in amygdaloid, hippocampal, and hypothalamic HIF expression in response to adolescent intermittent ethanol (AIE) exposure in rats. A rat model of adolescent binge-like ethanol exposure during postnatal days (PND) 28-41 was applied. Anxiety was measured using the light/dark box assay at adolescence, PND 41 and 42 (1 and 24 hours after the final ethanol exposure), and at adulthood, PND 92. Increased anxiety-like behaviors were detected in AIE adolescent rats during ethanol withdrawal and AIE adult rats. On the molecular level, AIE induced amygdaloid, hippocampal, and hypothalamic HIF subunit 3a (HIF3a) mRNA expression when ethanol was on board during adolescence. HIF3a expression increase was normalized upon withdrawal from ethanol. In AIE adult rats, HIF3a expression was decreased in the amygdala, increased in the hippocampus, and showed no significant change in the hypothalamus. These results suggest that HIF3a, via its regulatory actions on crucial target genes, may mediate ethanol-related behaviors on the molecular level. Altered HIF3a expression in adulthood, in response to AIE, may underlie the AIE mediated increased risk for alcoholism and anxiety-like behaviors in adulthood.

Biography

Christina V Floreani completed her combined MD, PhD training from the University of Illinois at Chicago in 2011. She is currently a fourth year psychiatry resident at the University of Illinois at Chicago and is participating in research to investigate the molecular biology of alcoholism, with the ultimate goal of advancing our treatment options for alcoholism with or without comorbid psychiatric disorders.

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