



RESEARCH TOPIC MECM_15

Dissecting alcohol-induced maternal neurobehavioral reprogramming

Curriculum

MECM Standard

Research Area

Neuro

Laboratory name

Pharmacology and Brain Pathology Lab - Team of Neurocircuits of Care and Vulnerability

Research Supervisor

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Abstract

Maternal alcohol drinking, a prevalent issue affecting half of the women with alcohol use disorder, poses a significant threat to maternal care and the long-term health of the progeny. Despite these alarming clinical data, basic alcohol research has largely overlooked the impact of alcohol on maternal brain and behavior. This is primarily due to a lack of comprehensive knowledge on the motherhood-induced molecular and functional reorganization of hypothalamic oxytocin neurons, which promotes maternal care. Our project addresses this urgent research gap by building an unbiased maternal behavior classifier, revealing the underlying hypothalamic oxytocin transients, and characterizing motherhood-induced transcriptomic adaptations in hypothalamic neurons of naïve and alcohol-exposed dams. The goal is to unravel alcohol-induced molecular and functional maladaptations in the maternal brain, providing potential circuit and pharmacological targets to rescue alcohol-induced maternal neglect.

Main technical approaches

Behavioral expertise, basic knowledge of synaptic and circuit physiology, intracranial, immunohistochemistry processing, intracardiac perfusion, mouse colony management

Scientific references

1. Stevenson JR, Young KA, Bohidar AE, Francomacaro LM, Fasold TR, Buirkle JM, Ndem JR, Christian SC. Alcohol Consumption Decreases Oxytocin Neurons in the Anterior Paraventricular Nucleus of the Hypothalamus in Prairie Voles. *Alcohol Clin Exp Res*. 2017 Aug;41(8):1444-1451. doi: 10.1111/acer.13430. Epub 2017 Jul 17. PMID: 28617958
2. Subramanian MG. Alcohol inhibits suckling-induced oxytocin release in the lactating rat. *Alcohol*. 1999 Aug;19(1):51-5. doi: 10.1016/s0741-8329(99)00017-8. PMID: 10487388

3. Mennella JA, Pepino MY, Teff KL. Acute alcohol consumption disrupts the hormonal milieu of lactating women. *J Clin Endocrinol Metab.* 2005 Apr;90(4):1979-85. doi: 10.1210/jc.2004-1593. Epub 2004 Dec 28. PMID: 15623810; PMCID: PMC1351273
4. Hashimoto H, Noto T, Nakajima T, Kato N. Effect of ethanol and acetaldehyde on the release of arginine-vasopressin and oxytocin from the isolated hypothalamo-hypophyseal system of rats. *Endocrinol Jpn.* 1985 Aug;32(4):489-96. doi: 10.1507/endocrj1954.32.489. PMID: 4085411
5. McMurray MS, Williams SK, Jarrett TM, Cox ET, Fay EE, Overstreet DH, Walker CH, Johns JM. Gestational ethanol and nicotine exposure: effects on maternal behavior, oxytocin, and offspring ethanol intake in the rat. *Neurotoxicol Teratol.* 2008 Nov-Dec;30(6):475-86. doi: 10.1016/j.ntt.2008.07.001. Epub 2008 Jul 11. PMID: 18664381; PMCID: PMC2581117

Type of contract

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