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Effects of acute and chronic maternal separation and alcohol intake on adolescent rats

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There is increasing evidence that environmental factors, particularly stressful events experienced early in life, increase the risk of developing a psychiatric illness and/or a behavioural disorder in adulthood. Extracellular glutamate (Glu) concentrations are regulated by glia cells and neuronal transporters proteins. First, we evaluated the effects of acute and chronic maternal separation (AMS and CMS) plus cold stress on the expression patterns and regulation of glutamate transporters (TGlu) in the developing and adult CNS. Rat pups subjected to MS were separated from their mother at postnatal day (PD) 5, 7 or 13 and were placed in separation cages for 1 h. After pups were returned to the home cage with their mother .Sodium-dependent Glu uptake using synaptosome-enriched fractions isolated from frontal cortex (FC) and hippocampus (Hic) was also studied. In the acute group, we found an increase in Vmax and decreased.. In the chronic group we detected the same pattern; an increment of Vmax and a decreased affinity. Western blotting analysis was used to evaluate expression changes of TGlu subtypes, EACC and GLT1 in FC and Hic. In acute group there was a significant increase in GLT1 both at PD5 and at PD13 in FC, while in Hic there was only an increase at PD7 in this transporter. On the other hand, western blotting shown at PD13 acute group a significant reduction in EACC (neuronal) expression levels in FC, though the chronic group increased EACC expression at PD55. In Hic, acute treatment produced an increase in the neuronal transporter at all ages analyzed, while chronic treatment increased EACC expression both at PD55 and PD63, whereas at PD57 it showed a significant decrease. These data demonstrate that adverse early life events have profound and persistent effects on brain function. Later, we investigated the consequences of chronic early life manipulations and alcohol intake on GluT on adolescent rats. In CMS, the pups were separated from their mothers and exposed to cold stress for 1 h during 20 days. Then animals were exposed to a voluntary ethanol intake for 7 days. We measured Glu uptake using time course and kinetic parameters on synaptosomes isolated from FC and Hic. Along with immunoblotting we showed detectable levels of the transporters subtypes: EAAC and GLT-1 in different treatments. Besides, we evaluated the plasmatic levels of corticosterone, catecholamines and transaminases enzymes. These results suggest that an exposure to CMS and alcohol after birth modify GluT activity and affect the hormones in hypothalamic-pituitary-adrenal (HPA) axis, which could be relevant to the function of GluT in the adult rat brain.

In conclusion: The early postnatal period and the bonds between mother and infant seem particularly important in the development and shaping of normal stress response and emotional behavior.

Biography

Gabriela Beatriz Acosta has received his PhD in Buenos Aires University (Pharmacology area). Currently, she is working as Institute of Pharmacological Research (ININFA), National Scientific and Technologic Research Council (CONICET) and University of Buenos Aires (UBA). She has successfully completed his Administrative responsibilities as Researcher. She is serving as an editorial member of several reputed journals like as Brain Research, Neuroscience Letters, Brain Research Bulletin, Neurochemistry International, Int. J. Developmental Neuroscience, Current Chemical Biology, and so on. She has authored of 33 international research articles, 10 national research articules and 3 chapters of books. She is a member of National Scientific and Technologic Research Council (CONICET) and University of Buenos Aires (UBA). She has honored as Peer Reviewer of NRR by Editorial Board.

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