

New implications for the melanocortin system in alcohol drinking behavior in adolescents: The glial dysfunction hypothesis

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Alcohol dependence causes physical, social, and moral harms and currently represents an important public health concern. According to the World Health Organization (WHO), alcoholism is the third leading cause of death worldwide, after tobacco consumption and hypertension. Recent epidemiologic studies have shown a growing trend in alcohol abuse among adolescents, characterized by the consumption of large doses of alcohol over a short time period. Since brain development is an ongoing process during adolescence, short- and long-term brain damage associated with drinking behavior could lead to serious consequences for health and wellbeing. Accumulating evidence indicates that alcohol impairs the function of different components of the melanocortin system, a major player involved in the consolidation of addictive behaviors during adolescence and adulthood. Here, we hypothesize the possible implications of melanocortins and glial cells in the onset and progression of alcohol addiction. In particular, we propose that alcohol-induced decrease in α -MSH levels may trigger a cascade of glial inflammatory pathways that culminate in altered gliotransmission in the ventral tegmental area and nucleus accumbens (NAc). The latter might potentiate dopaminergic drive in the NAc, contributing to increase the vulnerability to alcohol dependence and addiction in the adolescence and adulthood. © 2017 Orellana, Cerpa, Carvajal, Lerma-Cabrera, Karahanian, Osorio-Fuentealba and Quintanilla.

Alcohol drinking

Melanocortins

Metabolism and bioenergetics

Neuroinflammation

Synaptic dysfunction

aquaporin

corticotropin releasing factor

cyclooxygenase 2

cytochrome P450

dynorphin

glial fibrillary acidic protein

glutathione

immunoglobulin enhancer binding protein

inducible nitric oxide synthase

interleukin 1beta

intermedin

melanocortin

proopiomelanocortin

toll like receptor 4

tumor necrosis factor

adolescent

alcohol abuse

Article

binge drinking

brain development

brain dysfunction

drinking behavior

homeostasis

human

immunohistochemistry

in situ hybridization

learning

membrane potential

memory

nerve cell plasticity

nervous system inflammation

oxidative stress

synaptic transmission