Effect of Alcohol on Hippocampal-Dependent Plasticity and Behavior: Role of Glutamatergic Synaptic Transmission

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Problematic alcohol drinking and alcohol dependence are an increasing health problem worldwide. Alcohol abuse is responsible for approximately 5% of the total deaths in the world, but addictive consumption of it has a substantial impact on neurological and memory disabilities throughout the population. One of the better-studied brain areas involved in cognitive functions is the hippocampus, which is also an essential brain region targeted by ethanol. Accumulated evidence in several rodent models has shown that ethanol treatment produces cognitive impairment in hippocampal-dependent tasks. These adverse effects may be related to the fact that ethanol impairs the cellular and synaptic plasticity mechanisms, including adverse changes in neuronal morphology, spine architecture, neuronal communication, and finally an increase in neuronal death. There is evidence that the damage that occurs in the different brain structures is varied according to the stage of development during which the subjects are exposed to ethanol, and even much earlier exposure to it would cause damage in the adult stage. Studies on the cellular and cognitive deficiencies produced by alcohol in the brain are needed in order to search for new strategies to reduce alcohol neuronal toxicity and to understand its consequences on memory and cognitive performance with emphasis on the crucial stages of development, including prenatal events to adulthood.

alcohol dependence

glutamatergic synaptic transmission

hippocampus

neuronal toxicity

plasticity

alcohol

adulthood

alcohol abuse

alcohol consumption

alcoholism

brain nerve cell

cell death

cell plasticity

cell structure

cognition

drinking behavior

GABAergic transmission

glutamatergic synapse

hippocampus

human

memory disorder

mental performance

nerve cell plasticity

nonhuman

perinatal development

prenatal development

Review

synaptic transmission

task performance

temporal lobe