ETHANOL-INDUCED EXPRESSION OF ION CHANNELS IN RAT BRAIN SLICES

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Chronic alcohol consumption affects brain functions such as learning, memory and motor skills, which constitute signal transduction, neural transmission, and ion channels. However, any roles of ethanol in expression of ion channels in the brain have never been clarified. In this study, we evaluated the effects of ethanol on the mRNA expression of ion channels in the rat brain slices. The experiment with organotypic brain slice cultures was performed to examine the effects of ethanol on various genes expression. Wistar male rats (8 weeks old) were anesthetized by carbon dioxide and immediately decapitated. After brain dissection, the frontal and occipital poles including the cerebellum were removed, and then the specimens were sliced into 0.2 mm thick sections on a tissue slicer. Three hours after culture, the slice was incubated in the medium with or without 50 mM ethanol for 12 hours. RNA was isolated from the slice by TRizol. The expression of various mRNAs in the RNA samples was revealed by a quantitative real-time RT-PCR system. Ethanol treatment significantly increased the expression of ion channel related genes compared as non-treatment with ethanol. Therefore these findings suggest that expression of ion channels will cause ethanol-induced brain dysfunction.