Effects of consecutive high-dose alcohol administration on the utilization of sulfur-containing amino acids by rats

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Abstract

In this study, we attempted to evaluate changes in sulfur-containing amino acid (SCAA) metabolism after short-term high-dose alcohol ingestion. At the beginning of the study, six animals were sacrificed as the baseline group and then other animals in the experiment were consecutively gavaged with alcohol (30%, 3 g/kg) for 7 days. Animals (n=6 each) were subsequently sacrificed at the time points of Days 1 (Group E1), 3 (Group E3) and 7 (Group E7). Blood samples and selected tissues were collected at each time interval. SCAA, pyridoxal phosphate (PLP) and glutathione (GSH) levels were analyzed. Results showed that taurine levels of tissues (brain, liver, heart and kidneys) all declined after the ethanol intervention and continued to decrease in selected tissues except the brain during the experiment. Furthermore, the trends of plasma taurine and PLP contents were highly correlated (r=.98, P=.045). A similar utilization pattern of plasma taurine and PLP indicated that transsulfuration preferred taurine production to GSH synthesis. The trend of plasma taurine levels being positively correlated with PLP levels reveals that dramatic transsulfuration occurred to meet the urgent demand for taurine by brain cells. In conclusion, we reported that continual alcohol ingestion alters SCAA utilization, especially by depletion of taurine and hypotaurine and by elevation of S-adenosyl homocysteine in the selected organs.