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Expressional Changes of Carbamoyl Phosphate Synthetase and Glutamine Synthetase in the Liver of Rat with Thioacetamide-Induced Cirrhosis

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Abstract

Background: In order to detoxify ammonia, mammalian livers use carbamoyl phosphate synthetase (CPS) and glutamine synthetase (GS) for conversion into respective non-toxic urea and glutamine. CPS is expressed in the periportal hepatocytes whereas GS is contained in the pericentral hepatocytes.
Objective: To examine the expressional changes of CPS and GS in the liver being induced to become cirrhotic by hepatotoxin thioacetamide (TAA).
Material and Method: Twenty-five male Wistar rats were divided into 5 groups of 5 animals each. Group 1 was for control. Groups 2 to 5 were treated with 200 mg/kg TAA intraperitoneally three times weekly for 1, 2, 3 and 4 months respectively. The immunohistochemical technique was employed in order to elucidate the expression of CPS and GS in each animal group.
Results: As centro-central fibrous bridging developed in the course of TAA treatment, expression of CPS declined dramatically and that of GS was no longer restricted to the pericentral hepatocytes. In month 4, CPS-positive hepatocytes were only found in some regenerative nodules, whereas GS expression became confined to the nodular periphery. Proper CPS staining required tissue fixation in a mixture of methanol, acetone and water (2:2:1 v/v) as opposed to 4% paraformaldehyde.
Conclusion: In response to the hepatotoxin TAA, the liver attempts to regenerate by means of conserving persistent CPSposition hepatocytes and rearranging GS-positive hepatocytes in response to vascular obstruction.

Keywords: Cirrhosis, Fibrosis, Thioacetamide, Ammonia

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