

Diagnostic Evaluation of Carbon Tetrachloride Induced Rat Hepatic Cirrhosis Model

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Carbon tetrachloride (CCl₄)-induced chronic liver damage, such as fatty change, liver inflammation, fibrosis and cirrhosis, is useful animal model for studying pathogenesis of liver cirrhosis and screening hepatoprotective agents. But so far the final diagnosis of cirrhosis of animal and human was limited on the liver biopsy for the cause of the accuracy. Due to the limitation of biopsy for the complications and the fear explanation of many patient, other diagnostic parameter has been continuously demanded, such as non-invasive diagnosis parameter like the imaging of liver with ultrasound. For dissolving these problems, we evaluated the relationship of the hepatic cirrhosis grade between histopathology and mean grey level (MGL) in the B-mode ultrasonography in the CCl₄-induced liver cirrhosis. For this study, three groups of rats were treated with: (1) olive oil + 0.25% carboxymethylcellulose (CMC); (2) CCl₄ + 0.25% CMC; (3) CCl₄ + silymarin (inhibitory agents) (50 mg/kg) for known inhibitory agents. Rats (each group n = 5) sacrificed at week 4, 8 and 12 respectively, and then followed by the B-mode ultrasonography examination. The liver was processed for histopathological analysis by H&E, Azan and α -SMA staining. In the histogram, the silymarin group showed the highest value at 8 and 12 weeks. Otherwise, the grade of fibrosis in CCl₄ group was the highest (Grade 4). However, the fatty change was enhanced in the silymarin group, compared with CCl₄ group, indicating further hepatic damage leads to hepatic cirrhosis. These data may involved in one step delayed process of cirrhosis mediated by effects of anti-oxidants of silymarin. Furthermore, the histogram of B-mode mean grey level was well correlated with fatty change rates in our studies. In conclusion, the diagnostic criteria of cirrhosis induced by CCl₄ with B-mode ultrasonography is successfully established and is useful for the diagnosis of the liver parenchymal disease followed by histopathological analysis and can be applied for the fields of biomedical science and/or the aspects of clinical diagnosis.

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