Diagnosis of chronic liver disease from liver scintiscans by artificial neural networks

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Artificial neural networks were used in the diagnosis of chronic liver disease based on liver scintiscanning. One hundred and thirty-seven patients with chronic liver disease (12 with chronic persistent hepatitis, 39 with chronic aggressive hepatitis, and 86 with cirrhosis) and 25 healthy controls were studied. Sixty-five subjects (10 healthy controls, 20 patients with chronic hepatitis, and 35 patients with cirrhosis of the liver) were used in the establishment of a neural network. Liver scintiscans were taken starting 20 min after the intravenous injection of 111 MBq of Tc-99m-phytate. The neural network was used to evaluate five items judged from information on liver scintiscans: the ratio of the sizes of the left and right lobes, splenomegaly, radioactivity in the bone marrow, deformity of the liver and distribution of radioactivity in the liver. The neural network was designed to distinguish between three liver conditions (healthy liver, chronic hepatitis and cirrhosis) on the basis of these five items. The diagnostic accuracy with the neural network was 86% for patients with chronic hepatitis and 93% for patients with cirrhosis. With conventional scoring, the accuracy was 77% for patients with chronic hepatitis and 87% for patients with cirrhosis. Our findings suggest that artificial neural networks may be useful for the diagnosis of chronic liver diseases from liver scintiscans.

Key words: chronic hepatitis; cirrhosis; liver scintiscan; artificial neural network; technetium-99m-phytate