

## A Dynamic Study of Hepatobiliary System with $^{131}\text{I}$ -BSP and $^{131}\text{I}$ -Rose Bengal in Various Liver Diseases

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The study was undertaken with purpose of elucidating the mechanism of the jaundice and liver function. Thirty five subjects are studied including normal controls, patients with extrahepatic obstructive jaundice, intrahepatic cholestasis and hepatocellular diseases diagnosed by peritoneoscopy, histological examination or laparotomy. After intravenous injection of  $^{131}\text{I}$ -BSP and  $^{131}\text{I}$ -Rose-Bengal ( $100\text{--}120\mu\text{C}$ ), the disappearance curve of radioactivity in blood and the external counting over the liver were measured, and urinary excretion was measured simultaneously. A kinetic analysis was performed by assuming a three compartments model and the  $Q_1(t)$ ,  $Q_2(t)$  and  $Q_3(t)$  were corresponded with dynamic distribution of the blood, liver and the other organs. Dynamic distribution of the radioisotopes in each compartment was calculated by digital computer. The maximum hepatic uptake of  $^{131}\text{I}$ -BSP occurred at about 30 min. in normal subjects, 30—60 min. in patients with cirrhosis of the liver, 60—120 min. in intrahepatic cholestasis and 90—250 min. in obstructive jaundice. The liver uptake rate (represented by  $K_{21}$ ) was calculated at  $0.0949 \pm 0.0032/\text{min.}$  in normal subjects and  $0.0164$  in acute hepatitis,  $0.0147/\text{min.}$  in

cirrhosis of the liver,  $0.022/\text{min.}$  in intrahepatic cholestasis and  $0.0164$  in obstructive jaundice.

The values of excretion rate into bile ( $K_{02}$ ) were calculated at  $0.0013/\text{min.}$  in normal subjects,  $0.00013/\text{min.}$  in intrahepatic cholestasis and  $0.0$  in complete obstruction.

The reverse flow rate from liver to blood were calculated at  $0.0263 \pm 0.0013/\text{min.}$  in normal subjects,  $0.126/\text{min.}$  in obstructive jaundice.

If each pool size is estimated by the following formula  $P_i = \int_0^t Q_i(t) dt$ , blood pool size ( $P_1$ ) is estimated at  $51.8 \pm 12.3$  in normal subjects, slightly and moderately decreased in acute hepatitis (90.1) and cirrhosis of the liver (75.8) respectively. Whereas  $P_1$  is moderately increased in intrahepatic cholestasis (203) and complete obstruction (182.8). The liver pool size ( $P_2$ ) decreased in hepatocellular diseases, increased in complete obstructive jaundice and intrahepatic cholestasis.  $^{131}\text{I}$ -BSP excretion into bile was  $0.615 \pm 0.213$  in normal subjects,  $0.242$  in intrahepatic cholestasis and  $0.0$  in complete obstruction, in contrast urinary excretion of radioactivity was increased in later two diseases.

## Differential Diagnosis of Jaundice by Sequential Liver-Abdominal Scanning

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External monitoring of head, liver and abdomen after injection of radioactive rose bengal has been used as a sensitive indicator

for liver function disturbance. However by this method it was difficult to differentiate surgical from medical jaundice.