the external counting method for 15–20 minutes. During that time blood was drawn out at 5, 10, and 15 minute intervals after injection and that blood sample was counted on the well-type scintillation counter.

The figures were plotted on a semilogarithm graph taking Y on spindle as c.p.m. and time (min.) on transverse. These were analyzed in 2 components as a sudden drop (B) at the beginning and a gradual decrease (A) after 5–10 minute period. Then, we elongated the former slope (B) and the value $t = 0$ and named it (B_0) and elongated the latter slope (A) and named it (A_0). Using this graph, the following index was concluded: The half time of slope $A = T½$, decreasing index of the blood $K = 0.693/T½$; resting rate $R\% = S/A_0 \times 100$ or $S/A_0 + B_0 \times 100$.

We used three methods in calculating this index:

1. From curve Y we calculated A_0, B_0, T½. Sn was calculated by taking the relative equivalent count at X time and naming it R%.
2. Count was taken from each blood samples.
3. A combined method of (1) and (2) above.

Result:

Taking the mean value of ten normal persons, using Method 1, the T½ was 1.08 ± 0.11 min. of curve (B) and 10.2 ± 1.8 min. of curve (A), $K = 0.069 \pm 0.012$, $R = S15/A \times 100 = 33.7 \pm 7.6\%$, $S15/A + B \times 100 = 24.6 \pm 5.4\%$.

Using Method 2, T½ was 5.7 ± 1.2 min. (curve B), $K = 0.126 \pm 0.021$, $S15/A \times 100 = 18.0 \pm 6.0\%$.

In cases of patients suffering from liver dysfunction, T½ was extended; K decreased and R% increased.

Conclusion:

Comparing the three methods used, we found in Method 1, the curve had to be written explicitly. In Method 2, blood samples had to be drawn out three times and moreover skill is required to do this. In Method 3, curve A which was obtained by Method 1 made it possible to eliminate the procedure of drawing out blood. Assuming that from curve Y, Slope B signifies the diffusion of ^{131}I-BSP in the body and Slope A signifies the liver uptake of ^{131}I-BSP, it was better to use A_0 at 0 time density rather than $A_0 + B_0$.

For comparison purpose, we utilized ICG and found the results to be similar to that method where ^{131}I-BSP was used.

Metabolism of ^{131}I-BSP

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^{131}I-BSP was used in combination with BSP in rats as well as in humans. It was found that ^{131}I-BSP given i.v. to rats was excreted in bile quickly and almost totally. Alumina column chromatography of bile disclosed ^{131}I-BSP was conjugated as was BSP, but to a much smaller extent. Pretreatment of rats increased the conjugation significantly. It was also found that at least three conjugate forms appeared with BSP and there were corresponding forms of ^{131}I-BSP, and that the speed of elution was slightly faster in the latter.

When used with BSP in constitutional hyperbilirubinemia, it was found that the late rise of BSP in plasma in Dubin-Johnson Syndrome consisted mostly of conjugated

BSP. In such study, ^{131}I-BSP served as reference for the position of non-conjugate BSP. BSP was excreted in bile of Dubin-Johnson patients, but only non-conjugate form was present for the first one hour or so. In this syndrome, biliary excretion of conjugate BSP is impaired. In contrast, in Rotor syndrome, biliary excretion of both non-conjugate and conjugate forms of BSP was normal.

In experimental biliary obstruction, intravenously administered BSP appeared in plasma in conjugated forms. However in human obstructive jaundice, very little conjugate BSP was detected in plasma, yet urine contained considerable amounts of conjugate forms. ^{131}I-BSP is a useful adjunct in the study of BSP metabolism and hence of liver cell metabolism in general.

Studies on the Early Functional Disturbance of Irradiated Liver

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Many observations have been mainly based on histological experiments and have been indicative of vascular changes and intercellular hepatic edema by mild doses of liver irradiation. We reported early findings on scintigrams of the irradiated liver by ^{131}I-Rose bengal or ^{198}Au colloid, and another experiment were indicated that DNA synthetic rate of bone marrow decreased by liver irradiation (abscopal effect) and recovered by exogenous purines. Therefore the bone marrow cells may be supplied their necessary purine from the liver. Early functional damage may caused by irradiation. In this experiment, the liver function was observed by clearance of ^{131}I-BSP on 100 R. 3000 R. and 5000 R. irradiated liver and blood volume of irradiated liver was observed by ^{131}I-HSA.

Xray-irradiation: The amimal was shielded by 5 mm lead except the liver and 1000 R. 3000 R. or 5000 R. (190 KVp. 10 mA. 320R/Min) was irradiated.

Isotopes: 1) ^{131}I-BSP (40 μCi) was injected intravenously to rabbits, the venous blood was obtained at 30 sec., 1. 3. 5. 10. 15. 20. 25. 30. and 45 min. after injection and was measured by well type scintillation counter. 2) ^{131}I-HSA (6–12 μCi/0.1 ml) was injected intravenously to mice. Those animals were sacrificed by throwing into aceton dry-ice (-70°C) at 30 sec. after injection ,some parts of the liver and blood were obtained and were measured by well type scintillation counter.

Results: Blood volume of the irradiated liver increased at 30 min. after irradiation, slightly decreased at 1 to 3 days and recovered. ^{131}I-BSP clearance was disturbed on each irradiation dose. The disturbance was found immediately after irradiation and recovered. The period of disturbance indicated by ^{131}I-BSP clearance was simillar to that of increasing in the blood volume. These may be suggested that the early capillary damage which was induced by liver irradiation is one of cause of early liver functional disturbance.