From these findings it is assumed that the behavior of K’L in liver cirrhosis is dependent mainly upon the constancy of caval, portal liver blood flow at sitting posture.

Studies of Hepatic Circulation Using $^{198}$Au Colloid, $^{125}$I RB & $^{131}$I RB in the Liver Diseases

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The purpose of this report is to make a contribution to differentiate and to evaluate the various liver disorders.

Total cases are 92, including normal 20 cases hepatic tumor 31 cases, liver cirrhosis 22 cases, hepatitis 8 cases and others 11 cases.

Applying these tests to make external counting fasting patients are placed in the supine position.

Two scintillation probes with the crystal $2^\circ \times 2^\circ$ are placed over the liver and left femoral region.

The collimator over the liver is flat-field type and a lead plate measuring 1 cm thick is devised to shield the influence of the heart and spleen.

The simultaneous measurement with $^{125}$I RB and $^{198}$Au colloid is carried out.

At first $^{125}$I RB is administered i.v. The radioactivity is counted with scintillation rate-meter for 45 min. After that 6 $\mu$Ci/Kgm B. W. of $^{198}$Au colloid is injected i.v. and differential measurement is done.

Then, counting is carried out until hepatic curve reaches to plateau.

The curve of concentration of the $^{125}$I RB shows gradual logarithmical declining line usually after 5 min. of its injection.

The test using $^{125}$I gave the same result at periphery with that using $^{131}$I RB.

$^{125}$I RB peripheral concentration value of 5 min. is compared with that of 20 min. and 20:5 min. proportion i.e. P.C.R. is expressed as a percentage.

Normal value fell between 42 and 56%.
Liver tumor 44—80%
Heart failure 46—69%
Liver cirrhosis 62—90%

Hepatitis 56—77%.

$^{125}$I RB test mainly represents a function of polygonal cell and biliary tract.

The rate constant (K) of the $^{198}$Au colloid liver uptake is obtained from the liver uptake curve.

Normal value ranged from 0.132 to 0.200.
Liver tumor 0.065—0.172.
Hepatitis 0.092—0.192.
Liver cirrhosis 0.033—0.145.
Heart failure 0.0061—0.117.

$^{198}$Au colloid test shows effective liver blood flow.

Applying each test on these liver disorders, there are overlap on the obtained values of each test among the diseases, however, both test results are combined to investigate the relationship between $^{125}$I RB test and $^{198}$Au colloid test.

Taking $^{125}$I P.C.R. on the horizontal line and the rate constant (K) on the longitudinal line, it became very easy to differentiate the various liver diseases.

The normal group is distributed on the left upper part of the diagram, group of hepatitis on the right upper part, group of cirrhosis on the right lower part and group of heart failure on the left lower part, showing a radiating distribution around the normal group as a center.

Primary or metastatic liver tumor does not show such characteristic distribution as diffuse liver disease.

The statistic observation on the liver diseases in the $^{125}$I RB $^{198}$Au colloid combined diagram represents the characteristics of the various liver diseases, and if it is plotted on the right upper part, it represents the disturbance of liver cells or biliary
tract and if it is on the left lower part, decreased effective liver flow, and general cardiovascular disorder or proliferation of the liver stroma are suggested.

A Hepatic Function Test by Radioisotopes

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1) A method for estimation of the hepatic function were presented using radiogold (¹⁹⁸Au) and ¹²⁵I labeled rose bengal dye.
2) Continuous recordings of external counting were performed by four scintillation counters (two of 2 x 3 inches and two of 2 x 2 inches NaI X tals) which were connected to pulse-hight analyzers, rate meters and with a four channel tape-recorder and a two penrecorders. The probes were collimated with lead and one of them placed on a little up to the heart and the another on the right side of the liver.
3) The Radiogold was injected into the antecubital vein. Two curves (liver and heart) were analyzed by substraction each other to estimate the true ¹⁹⁸Au concentration in blood and ¹⁸⁸Au in liver. The blood samples being collected after injection, radioactivities of the samples were measured by a well-type scintillation counter. Comparing both data of calculating and blood sampling, this method seemed to be reliable.
4) Injecting ¹³¹I labeled rose bengal dye into antecubital vein and sampling bile from duodenum, the excretion of the dye was delayed in hepatitis compared to normal cases.
5) The curve obtained from a counter on the liver was expressed as a straight line on a bi-logarithmic paper, and some difference in slope was found between normal group and patients with liver diseases.

Classification of ¹⁹⁸Au Liver Scintigram Patterns and Their Diagnostic Approach

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A new information of a relationship between the patterns of the ¹⁹⁸Au liver scintigram and the liver diseases is reported. 631 liver scans by colloidal radiogold (¹⁹⁸Au) were performed on 517 patients during the period between May 1962 and July 1965. Established diagnosis were given on 301 patients by
1) autopsy
2) surgical exploration
3) needle biopsy or peritoneoscopy and
4) clinical course and clinical finding (followed up over 2 years).

301 liver scintigrams were classified into the following patterns in accordance with the size, shape, position and internal configuration of the liver and the degree of the spleen visualization.
1) Standard (pattern)
   25 of 33 cases which showed this pattern were proved to be normal.
2) Spleen visualization
3) Mild hypertrophy of the left lobe.