

Iron Metabolism in Tumor-Bearers

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Recently, it is well confirmed that tumor bearing results in a derangement of the iron metabolism of the host. Iron exchange between body tissues is accomplished by a mechanism in which iron is bound to a fraction of plasma protein and transported. The major portion leaving the plasma is normally directed towards the bone marrow where it is used for hemoglobin synthesis. On the other hand, it is known that more than 90 per cent of daily iron required by the bone marrow to synthesize hemoglobin must come through the reutilization of iron from senescent red blood cells. Thus, studies on the iron metabolism in the reticuloendothelial system of tumor-bearers might be helpful in understanding the mechanism of deranged iron metabolism. Moreover, the intestinal iron absorption in tumor bearing state is concerned with special references to storage iron and erythropoiesis.

The patients with gastric and bronchogenic carcinomas and adult albino rats with subcutaneously inoculated Yoshida sarcoma were examined as tumor-bearers.

Ferrokinetic studies by infused ^{59}Fe -globulin showed that plasma radio iron disappearance half-time, plasma iron turnover and utilization percentage of red blood cells were within normal limits, whereas the plasma iron pool and serum iron level were markedly decreased in tumor-bearers. These results seem to support the view that the

tumor-bearers are in an iron deficient state, however, the erythropoietic activities are maintained within normal limits.

Rats subcutaneously inoculated with Yoshida sarcoma showed a marked reduction of iron absorption to as low as 13%.

On the other hand apparent half-time of red blood cells in tumor-bearers were markedly shortened. As these red blood cells are destroyed in reticuloendothelial system, the function of reticuloendothelial system was examined. The decrease of red blood cell utilization of infused colloid radioiron and delay of the maximal utilization were observed in tumor-bearers. Moreover, it was interesting to note that the decreased hemoglobin levels in cancer patients were in parallel with the decrease of percentage of red blood cell utilization after the administration of ^{59}Fe labeled chondroitin sulfuric acid iron. Therefore, the defective utilization of iron in the reticuloendothelial system of tumor-bearers and reduction of iron absorption from intestinal tract probably account for the causation of deranged iron metabolism.

These deranged iron metabolisms in the reticuloendothelial system depend on the disturbance of ferritin formation which was clearly demonstrated by the ultramicroscopic examination of Kupffer cells after injection of colloid iron and immunochemical determination of hepatic ferritin in tumor-bearers.

Studies on Iron Metabolism in Hepatic Disorders

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The iron metabolism in various hepatic diseases was studied, compared with iron overloaded disorders. The formers are acute and

chronic hepatitis and cirrhosis of the liver, and the latter are various types of iron overload, including idiopathic hemochromatosis.

sis and hemosiderosis accompanied with blood diseases. The Ciba laboratory's method was used to measure the urinary iron after the administration of desferrioxamine. Ferrokinetic study was carried out according to Huff's method. The iron deposition in biopsied liver specimen was graded after the Greenberg's criteria. Iron absorption was measured by giving 5 mg. ferrous sulfate labelled with ^{59}Fe .

Results: 1) Although each value of serum iron in liver diseases ranged widely, the average levels in each group were all higher than normal; in the order of acute hepatitis, cirrhosis and chronic hepatitis. Relation between SGPT and serum iron was as follows: In acute hepatitis, higher SGPT values showed higher serum iron levels. On the contrary, most subjects with liver cirrhosis showed high serum iron levels even in the subjects with low SGPT. No significant relationship was observed between both values in chronic hepatitis. 2) Markedly increased iron granules were found in iron overloaded disorders. Mild iron deposition was found in acute and chronic hepatitis. On the other hand, remarkable iron deposition was found in some cases of liver cirrhosis. 3) Six-hour urinary iron excretion after the i.m. injection of 500 mg. desferrioxamine was determined. Increased urinary iron excretion was found in liver diseases; the average levels in each group were all higher than normal; in the order of liver cirrhosis, chronic hepatitis

and acute hepatitis. The data presented are interpreted as indicating that liver diseases, especially liver cirrhosis, are frequently associated with body iron overload. 4) Rather low iron absorption rate was observed in iron overloaded subjects. All cases of acute hepatitis except one were within normal range. Some cases of chronic hepatitis and cirrhosis showed increased iron absorption. 5) Red cell survival was measured by ^{51}Cr method. Slight to moderate shortening was observed in some cases in each group of liver diseases. 6) Ferrokinetics was performed in 2 cases of chronic hepatitis, 6 of cirrhosis and one of idiopathic hemosiderosis. Generally, slow decline of plasma iron disappearance was found in the subjects with high serum iron levels. Red cell utilization, however, was found to be normal in the same subjects. No remarkable uptake of iron by the liver as shown in well-established hemochromatosis was found in this study.

From these results, it was considered that the increased serum iron levels in acute hepatitis may not be due to increased iron absorption, but mainly due to ferritin iron caused by liver tissue destruction. On the other hand, high serum iron level and increased hepatic iron deposition shown in liver cirrhosis may be mainly the result of increased body iron store is the result of increased iron absorption. In chronic hepatitis, the factors in the both two diseases may be involved.

Symposium IV. Diagnostic Use of RI in the Field of Gynecology

(Chairman) H. Fujimori, Osaka City Univ.

Diagnosis of the Uterine Cancer Using Radioactive Isotopes

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The diagnostic method for the uterine cancer using radioactive isotopes has many advantages as follows:

This is a non-operative method easy and simple to detect. The result is obtained quickly and objectively. Usually ^{32}P is