

CLINICAL EVALUATION OF SERUM IRON AND FERRITIN

Hiroshi Saito* and Daizaburo Hayashi**

*Department of Radiology, Nagoya University School of Medicine, **Radioisotope Laboratory, Nagoya University Hospital

Ferritin was radioimmunoassayed in normal, hematologic disorders, and liver diseases.

Serum iron was 115 ± 42 ($\mu\text{g/dl}$) in 142 normal males, and it was 91 ± 35 in 42 normal females. Serum ferritin was 161 ± 86 (ng/dl) in 42 normal females, 9 cases out of 35 (26%) were iron deficiency anemia. Thus, a large population of latent iron deficiency must be included in normal females. Therefore, the normal value may not exist for female. In normal, a diurnal variation was observed for serum iron, but for ferritin. In iron overload and deficiency, the diurnal variation of serum iron was small. Fluctuation was marked in serum iron level in iron overload undergoing deferrization therapy, but it was not marked in ferritin level. On the other hand, ferritin showed a rapid decrease, while serum iron was kept high when iron therapy was not sufficient for iron deficiency anemia. In patients with hyperthyroidism treated with ^{131}I showed a rapid decrease of serum iron and ferritin, suggesting the lability of ferritin as a portion of storage iron pool. The increase of ferritin in liver diseases, and various blood diseases, such as aplastic anemia, acute myelocytic leukemia, hereditary spherocytosis, thalassemia. However, the increase of ferritin in these cases was not so marked as in iron overload including transfusion hemosiderosis and idiopathic hemochromatosis. The decrease of ferritin was observed in PNH, polycythemia vera, and in iron deficiency anemia, especially (lower than 12 ng/ml). Serum iron, and saturation were also decreased in the latter 3 groups. The decrease of serum iron, and increase of ferritin were observed in chronic inflammation and malignancies in part. There observed the trend of saturation for ferritin formation, but for hemosiderin when iron was overloaded to the experimental animals. Therefore, serum ferritin can hardly reflect the total amount of storage iron in iron overload. The radioimmunoassay of ferritin made the differential diagnosis of iron deficiency anemia more reliable than before. The significance of ferritin assay for the diagnosis of malignancies is still questionable, since ferritin formation depends on iron.

RADIOIMMUNO ASSAY OF SERUM FERRITIN AND ITS CLINICAL EVALUATION

Tetsugoro Tanaka*, Masaharu Umino*, Hideo Kimura*, Shin Matsuda*, Tsuyoshi Akitsuki*, Hiroshi Yoshida*, Tatsumi Uchida*, Shigeo Kariyone*, Masaru Saito**,

*First Department of Internal Medicine, **Radioisotope Research Division, Fukushima Medical College, Fukushima.

The determination of serum ferritin values is useful for the diagnosis of iron deficiency, iron overload, malignant diseases, liver diseases, etc. The fundamental studies on 2-site immunoradiometric assay (paper disc method) of serum ferritin was carried out and the evaluation of serum ferritin values in various hematologic diseases was discussed. Results were obtained as follows:

1. Satisfactory results were obtained even at room temperature. On the first reaction, the maximum radioactivity of the paper disc was shown within 1 hour, but at 37°C the longer incubation was carried out, the lower radioactivity were found. On the second reaction, the incubation time was necessary more than 5 hours.

2. The variation coefficient and %recovery of each determination were 9.5% and 95.2%, respectively. The linearity from 2 to 100 times dilution of serum samples and the reproducibility between different 2 kits were also satisfactory. The range from 1 to $10,000 \text{ ng/ml}$ of serum ferritin could be determined by this kits. These results indicate that this assay method is satisfactory enough to use practically.

3. The mean concentration of serum ferritin in normal adults was $153 \pm 73 \text{ ng/ml}$ in male and $42 \pm 24 \text{ ng/ml}$ in female, respectively.

4. In the iron deficiency anemia, the serum ferritin concentration was below 12 ng/ml in all cases. In the iron overload, however, such as aplastic anemia, sideroblastic anemia and myelofibrosis, the high values of serum ferritin up to 1000 ng/ml were shown in the half of the cases. The high values were also obtained in the patients with malignant diseases, such as acute leukemia, blastic crisis of CML and malignant lymphoma, especially Hodgkin's disease. These results indicate that the serum ferritin concentration may be the valuable indicator of the body iron store and suggest the usefulness for the diagnosis of various malignant hematologic diseases.