Ferrokinetics (I)
On the Index of Effective Erythropoiesis

H. SAITO
Department of Radiology
H. YAMADA
Department of Internal Medicine, Nagoya University School of Medicine
M. HIRADE
Department of Internal Medicine, Chubu Rosai Hospital

For the evaluation of effective erythropoiesis, percent red cell radioiron utilization (% RCU), red cell iron turnover (RCIT), which is obtained by multiplying $\frac{\%\ \text{RCU}}{100}$ with plasma iron turnover rate (PIT), and reticulocyte count have been used. However there has been no index on the rate of effective erythropoiesis.

This is to report the amount and rate of effective erythropoiesis.

The red cell iron renewal (RCIR), the amount of effective erythropoiesis, was obtained by dividing total hemoglobin iron (HbFe) with mean red cell life span determined by using DF^{32}P method. The effective erythorpoiesis rate was obtained by dividing RCIR with PIT. The difference between RCIT and RCIR is due to the additional fixation of radioiron reflex from storage beyond the rate of HbFe to the total body iron.

Therefore, RCIT is gross, and RCIR is net red cell iron turnover in the equilibrium of red cell production and destruction.

The effective erythropoiesis rate was lowest (28 %) in hemolytic syndrome, low (46 %) in aplastic anemia, high (63 %) in iron deficiency anemia, and highest (78 %) in polycythemia vera.

Ferrokinetics (II)
The Relationship Between Storage Iron and Percent Red Cell Radioiron Utilization as an Index of Effective Erythropoiesis

H. SAITO
Department of Radiology
H. YAMADA, T. HOTTA, and T. TAKITA
Department of Internal Medicine, Nagoya University School of Medicine

Although percent radioiron utilization (% RCU) is thought as an important index of effective erythropoiesis, it is largely influenced by the amount of storage iron. The decrease of % RCU by the increase of storage iron does not mean the ineffectiveness of erythropoiesis. To clarify the

relationship between % RCU and storage iron, 100 cases were studied. The height, body weight and hemoglobin (Hb) value were used for the estimation of storage iron in most of the cases, and it was also calculated from the total amount of depleted blood in patient with hemochromatosis. The amount of storage iron to total body iron was expressed as % storage. % RCU and % storage were inversely proportional. % RCU was usually higher than the ratio of Hb iron to total body iron due to the fixation of radioiron reflux from storage.

The fixation was decreased when the amount of storage iron was increased, but the effect of storage iron to % RCU was small when the amount of storage iron was normal. The relationship between % RCU (u) and % storage (s) was expressed by the following formula

$u = 1 - s^n$ where n means the time

$s^n = 1 - u$ of partition of radioiron according to the ratio of Hb iron(r) to storage iron(s)

$r + s = 1$

$$n = \frac{\log (1-u)}{\log s}$$

According to this formula the value n was obtained in various disease group, in relation to red cell iron renewal, plasma rion turnover as well. The difference was seen in hemolytic syndrome, especially in the group of having ineffective erythropoiesis.

Ferrokinetics in Erythroleukemia —With Special Reference to Whole Body Linear Scanning

T. HOTTA and H. YAMADA

First Department of Internal Medicine, Nagoya University School of Medicine

H. SAITO

Department of R diology, Nagoya University School of Medicine

Ferrokinetic studies with a whole body monitoring were performed in 11 patients with erythroleukemia (erythremic stage). The results were as follows: PID T1/2 72±28 (mean±S. D.) min., % RCU 10.5±10.3%, PIT 1.62±0.53 mg/kg/day and EIT 0.19±0.20 mg/kg/day. A significant correlation was observed between EIT and the numbers of circulating reticulocytes ($r = +0.938$), and between PIT and hemoglobin value ($r = -0.684$). However, no correlation was observed between serum iron and PID T1/2 value.

The distribution patterns of the erythropoietic marrows in 7 cases of erythroleukemia were evaluated with a ring-type whole body linear scanning using ^{59}Fe. In those 7 cases, the patterns longitudial scan from head to foot at 24th hour after injection of ^{59}Fe which reflect the erythropoietic marrow distribution, were classified into 3 types, that is, the type of erythroid hyperplasia and expansion of bone marrow (4 cases), the type of extramedullary erythropoiesis (2 cases) and the type of erythroid hypoplasia and deposition of ^{59}Fe in the liver (3 cases at leukemic transformation or after blood transfusion). Judging from the distribution patterns of ^{59}Fe at 10th day, the retention of ^{59}Fe in the bone marrow was observed in 5, hemolysis in 4 and the iron deposition in the liver or spleen in all 7 cases.

The ferrokinetic indices and the distribution patterns of ^{59}Fe became normalized in two cases