Studies on the Reticuloendothelial Phagocytosis and Ferrokinetics in Rauscher Leukemia

T. Sezaki, Y. Ozaki, K. Matoba,
I. Mizukawa, S. Irino and K. Hiraki

Department of Internal Medicine Okayama University Medicine School, Okayama

Pathogenesis during induction and development of mouse leukemia caused by Rauscher Virus (RV) is under dispute. However we already reported that the disease caused by RV was erythroleukemia and which is associated with hemolytic anemia.

The present study was undertaken to learn about the mechanism of hemolytic anemia and its pathogenesis.

1) Alterations in the phagocytic capacity of Reticulo-endotheleal System were measured by carbon clearance method. At the early stage following inoculation of RV, the rate of carbon clearance was elevated, subsequently fell gradually and, by the 12 weeks, it was markedly depressed. As for the heated ^{51}Cr-labelled red cell method, effects of temperature and time on labelling (cpm), uptake (%) and hemolysis were investigated. Consequently, 400 μCi/6 ml blood, 49°C, 20 min. or 60 min. were applied on the following experiment. In both conditions (20 min. and 60 min.), the % uptake of injected ^{51}Cr(cpm) by the spleen and liver increased at the initial stage of leukemia. Then weeks after infection, there was a progressive increase in the % uptake by the liver. However, the % uptake by the spleen were near normal or decreased and uptake of ^{51}Cr/mg of leukemic spleen was markedly decreased as compared to the normal.

2) Determination of RBC survival were performed by cohort label(^{51}Cr) technics. Labelled RBC from leukemic mice have a shortened survival in normal and more shortened in leukemic mice compared with survival of normal cell in normal mice. Survival of RBC from normal mice were also shortened in leukemic mice. These result suggested that shortened RBC survival in Rauscher Leukemia were induced by both intracorpuscular defect and extracorpuscular cause resulting in a hemolytic anemia.

3) In the study of ferrokinetics, individual mice were given I.V. injections of 1.0μCi of ^{59}Fe in the physiologic saline solution. Changes of the mean radioiron clearance (^{59}Fe T1/2), and reapearance of ^{59}Fe in RBC were observed during development of leukemia. In addition, % uptake of injected ^{59}Fe and the % uptake of ^{59}Fe/gm were determined in the spleen, liver and bone marrow. One week after infection, elevated plasma iron and shortened ^{59}Fe T1/2 was noticed. The 24-and 48-hr % uptake by spleen and uptake/gm spleen were increased with depressed ^{59}Fe reappearance. From 3 weeks to 7 weeks, plasma iron was still elevated. ^{59}Fe T1/2 was below normal but, with the elapse of time post-infection, the reappearance was gradually increased over 100% at 24 hr after injection, and the 24-hr % uptake/gm spleen decreased. However, the % uptake by the spleen was highest at 3 weeks, subsequently decreased but was still higher than normal.

In summary, in consideration of the previous observation of histo-pathologic studies, phagocytic activity of RES was markedly depressed by the leukemic changes in the spleen, whereas, hepatic activity was significantly elevated, which interpreted as relating to associated haemolytic anemia with shortened survival of RBC. Ferrokinetics data indicate early malignant proliferation of erythroid cells in the spleen and later accelerated erythroid cell maturation accompanying hemolytic anemia.