

Title : Fate of plasma hemoglobin in uninfected Macaca mulatta and in P. falciparum malaria

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Objective To study the fate of plasma hemoglobin in terms of the rate of removal from the plasma, the distribution in liver, spleen and bone marrow and the urinary excretion.

Description The mechanism of hemolysis in malaria is not fully understood. It is assumed that both parasitized and non-parasitized cells are destroyed. The question remains whether the destruction occurs mainly intravenously or in the reticulo-endothelial system.

It was suggested that erythro-phagocytosis was a major factor in the destruction of erythrocytes in malaria and spleen was the principle site of this process (Zuckerman, 1966). Recently, we detected free hemoglobin in the plasma in cases of induced falciparum malaria, thus indicating intravascular hemolysis. The fate of hemoglobin in these cases was also studied.

The present work was undertaken to study the fate of plasma hemoglobin given intravenously (to simulate intravascular hemolysis) to normal monkeys and to compare it with that occurring in malaria cases.

Rhesus monkeys (Macaca mulatta) were used in this experiment. Hemoglobin was labelled with Fe⁵⁹. The labelled hemoglobin solution was injected intravenously and the radioactivity in the plasma was measured at 10 minutes, 20 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours and 24 hours. The radioactivity of the spleen, the liver, the bone marrow and the urinary bladder was recorded by surface counting at 1/2 hour, 2 hours, 4 hours, 6 hours, 24 hours, 48 hours, 72 hours and 96 hours.

120 μ c of Fe⁵⁹ were injected intramuscularly into a donor monkey. About 14 days after the injection, 10-15 ml of blood was drawn, hemolysed and then injected into the experimental monkeys.

A manual scanning probe of the Surgical Scintillation Detector Set (Nuclear-Chicago Model DS. 8.1) was used.

Progress Plasma disappearance The half period (T 1/2) varied from 88-140 minutes. At 6 hours after injection the radioactivity in the plasma was about 7 percent of the injected dose and there was no radioactivity left in the plasma at 24 hours.

Radioactivity in the organs Radioactivity in the spleen and the liver increased progressively and reached the peak about 48 hours after the injection and then decreased gradually. The activity in the bone marrow increased slightly and reached a peak at about 24 hours. Radioactivity could be detected in the urinary bladder at 30 min and then increased progressively for 6 hours. At 24 hours there was no radioactivity left in the bladder. So far, the pattern has been more or less similar to that observed in induced P. falciparum cases. Further investigations are in progress.