

## Changes of the Plasma Volume during Extracorporeal Circulation

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Using the RISA as an isotopic tracer, the plasma volume was repeatedly measured during extracorporeal circulation in the following two clinical groups. Group I; the bubble type sheet oxygenator primed with lactated Ringer solution, and Group II; the rotating disc oxygenator primed with Haemaccel. Heparinized blood was added, if necessary, to keep the dilution rate between 20 and 25%. Rapid reduction of the plasma volume was observed in the Group I, while changes of the plasma volume were generally mild and even negligible in some of the Group II.

Animal experiments were also performed to determine the effects of each different perfusate as well as oxygenator upon changes of the plasma volume, in the following 4 groups; (A) disc oxygenator and Haemaccel, (B) disc oxygenator and lactated ringer, (C) bubble oxygenator and Haemaccel, and (D) bubble oxygenator and lactated Ringer. Reduction of the plasma volume was very slight in (A), mild in (C), and considerably rapid in (B) and (D), suggesting that the plasma volume changes are much more influenced by the primed perfusate than the oxygenator.

The analysis of the radioisotope data showed fairly wide deviation. Such a deviation is, presumably, caused by repeated administration of the RISA and its loss from the blood.

The reduction rate of the RISA was compared between dogs under extracorporeal circulation and those merely under nembutal anesthesia. It was more remarkable in the former group.

In order to determine the deviation of the repeated measurement, the plasma volume was measured in the following manner, using three dogs in each. (A) The measurement was repeated 3 times 40 minute intervals and with 5 micro c. RISA administration at each time, (B) 6 times with 10 minute intervals and with 5 micro c. RISA in each, (C) 6 times with 10 minute intervals and with 5 micro c. (at 0, 10 and 20 minutes) and 50 micro c. RISA at 30, 40 and 50 minutes). The maximum deviation of each from the first value were (A) 5.5%, 3.1% and 5.1%, (B) 20.4%, 25.0% and 30.0%, (C) 8.5% 12.1% and 9.2%, respectively.

Cr-51 labeled red cells are considered to remain in the intravascular space even under such circumstances as extracorporeal circulation. Red cell mass was measured in two dogs, 6 times with 10 minute intervals and with 30 micro c. Cr-51 in each. The maximum deviations were 8.9% and 12.0%, which were lesser than those of the plasma volume measured with the RISA.