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THE DISTRIBUTION OF OXYGEN IN THE PERFLUORCARBON EMULSION; AQUEOUS PHASE AND RED BLOOD CELLS DURING AND AFTER EXCHANGE OF BLOOD IN DIFFERENT WAYS IN RATS

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During the investigation of perfluorcarbon emulsions as a possible blood substitute, the question, whether the oxygen supply depends on the way of blood exchange or not, was of great interest. The A. carotis and V. jugularis of rats were catheterizid to measure different parameters of arterial and venous blood, as pH, pCO_2 and pO_2 for instance. Following a proposal of ROSEN et al. (Crit. Care Med. 10 (1982)3, p. 149-154), we calculated the absolute and relative as well as the arterial and venous oxygen contents in the blood cells, in the plasma and in the perfluorcarbon phase on the basis of our data.

For the infusion of the emulsion the tail vene was used. The withdrawal of blood from the V. jugularis and A. carotis was carried out continuously or discontinuously, simultaneously or alternately with the infusion of the emulsion. Artificial respiration with pure oxygen was applied to the animals.

As expected, it could be proved that in the case of a blood loss perfluorcarbons improve the supply of the organism with oxygen. During the blood exchange the oxygen supply of the tissue is dependent on the infusion technique. Whereas an arterial withdrawal of blood is pathophysiologically unfavourable; the organism better tolerates the venous withdrawal of blood. If there is an alternating withdrawal and infusion the organism is sufficiently supplied with oxygen. About one hour after the blood exchange by the perfluorcarbon emulsion up to a Hk of 0,05, perfluorcarbons ensure the supply of tissues with oxygen, corresponding to the normal value of 4,0 - 5.0 ml O_2/100 ml.