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## Hemoglobin-albumin cluster: physiological responses after exchange transfusion into rats and blood circulation persistence in dogs

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**Abstract:**

A core-shell protein cluster comprising hemoglobin and human serum albumins, hemoglobin-albumin cluster (Hb-HSA<sub>3</sub>), was designed and synthesized for use as an artificial O<sub>2</sub> carrier and red blood cell (RBC) substitute. For initial preclinical safety evaluation of the Hb-HSA<sub>3</sub> solution, we observed blood compatibility in vitro, physiological responses after exchange transfusion into rats, and blood circulation lifetime in dogs. Dilution of human whole blood with Hb-HSA<sub>3</sub> showed an appropriate decrease in blood cell number, proportional to the mixing volume ratio. Time courses in the circulation parameters and blood gas parameters after 20% exchange transfusion with Hb-HSA<sub>3</sub> in anesthetized rats were almost identical to those observed in a sham group (without infusion) and an HSA group (with HSA administration) for 6 hr. Serum biochemical tests of the withdrawn blood indicated safety of the protein cluster. Furthermore, fluorescent Hb-HSA<sub>3</sub> was infused into beagle dogs to assess blood retention. Fluorescence measurements of the blood samples enabled us to ascertain the cluster half-life within the intravascular space. Histopathologic inspections of the vital organs imply no abnormality in tissues. All these results indicate sufficient initial preclinical safety of Hb-HSA<sub>3</sub> as an alternative material for use in RBC transfusion.

■ 理工学研究所との関連

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