The effects of freezing on long-term storage of canine erythrocytes

D. Aktaran Bala¹, M. Özcan²

¹ Istanbul University, Faculty of Veterinary Medicine, Vocational High School, Food Processing Department, Food Technology Programme, 34320 Avcilar/Istanbul/Turkey
² Istanbul University, Faculty of Veterinary Medicine, Physiology Department, 34320 Avcilar/Istanbul/Turkey

Abstract

Human medicine studies have so far demonstrated that erythrocytes may be preserved and stored at low temperatures for decades retaining their metabolic and biochemical properties. However, detailed studies regarding this problem are not yet available in veterinary medicine. Therefore, the objective of the current study was to investigate time-dependent effects of long-term frozen storage of canine red blood cells.

Twelve healthy adult dogs meeting the criteria for blood transfusion were used in the study. Whole blood samples (450 ± 45 ml) collected from each dog were centrifuged by a cryogenic microcentrifuge and packed RBC suspensions were obtained. The samples were prewashed three times in 0.9% NaCl solution and were allocated into three groups to be evaluated at three different time points (day 0 and month 4 and 6). The samples to be frozen were subjected to glycerolization and then stored at -80°C for 4 and 6-month periods. At the end of this period the packed RBC samples were thawed, centrifuged and then washed in a consecutive series of dextrose solutions. 2,3-Diphosphoglycerate (2,3-DPG), Adenosin triphosphate (ATP), supernatant hemoglobin (SupHb), sodium (Na⁺) and potassium (K⁺) levels, residual glycerol concentrations and hemograms were evaluated and compared. Sterility tests were performed on all samples for bacterial contamination. A statistically significant decrease was noted in potassium levels, which was the natural outcome of deglycerolization process. No significant change was observed in terms of other parameters due based on different time points. In conclusion, long-term frozen storage had no negative effect on the quality parameters of canine erythrocytes.

Key words: canine, cryopreservation, erythrocyte, glycerol, storage

Introduction

Novel diagnostic and therapeutic approaches have appeared in veterinary medicine with advance of technology. Likewise, transfusion medicine has gained importance in response to increased demands (Kim et al. 2004, Lucas et al. 2004). Developments in blood storage techniques are important scientific achievement for the maintenance of Blood Banks in terms of the availability of blood products for therapeutic pur-