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The effect of sex in the storage capacity of red blood cell concentrates in CPD/SAGM

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Statement of the Problem: Red blood cells (RBCs) are the most frequently transfused blood labile product. The "Donor variation effect", which refers to donor-to-donor differences observed in both blood storage quality and 24h recovery, is probably a key factor in the efficiency of transfusion therapy. Donor variation effect may be associated with genetically determined features of RBCs and plasma. The aim of this study was to examine whether the donor's sex may independently affect the storage capacity of donated RBCs.

Methodology & Theoretical Orientation: For this purpose, 14 leukoreduced units of RBC concentrates in CPD/SAGM (7 male-7 female) were stored for 42 days at 4-6°C. Several parameters of storage quality (including hemolysis, redox status etc) were examined before and throughout the storage period. SPSS was used for statistical analysis of the results.

Findings: In-bag hemolysis, as well as osmotic and mechanical hemolysis, and intracellular calcium indexes were equally low in both groups during the whole period of storage. On the contrary, redox status markers such as total and uric acid-dependent antioxidant capacity of the supernatant were significantly higher in male donors' units ($p < 0.01$). In the same group of donors, intracellular ROS accumulation was higher during the first two weeks of storage ($p < 0.05$), while exogenously stimulated ROS production was higher after the middle of the storage period (797 ± 220 vs 504 ± 48 RFU, $p < 0.05$).

Conclusion & Significance: Donor's sex does not seem to affect the hemolytic parameters of the leukoreduced RBC units under storage in CPD/SAGM. Male sex is rather associated with better extracellular antioxidant activity, but worse intracellular redox status and increased susceptibility to exogenous oxidative stimuli. Sex may represent a genetic variant that affects some aspects of the RBC storage lesion. This study was supported by "IKY FELLOWSHIPS OF EXCELLENCE FOR POSTGRADUATE STUDIES IN GREECE - SIEMENS PROGRAM" to Vasileios Tzounakas.

Biography

Vasileios L. Tzounakas is a Post-doctoral researcher at the Department of Biology (Section of Cell Biology & Biophysics) of the National and Kapodistrian University of Athens (NKUA). He has obtained Ph.D. in Cell Biology. He has served as reviewer in international journals while his main research interests include blood transfusion biology (mainly, red blood cell storage lesion in blood products used for transfusion), erythrocyte biology in health and disease and the study of extracellular vesicles. He has expertise in evaluating the key parameters that affect storage lesion and post-transfusion performance of red blood cells and in the management of blood supplies in a way that will lead to the individualization of transfusion therapy. In this context, he has focused on the elucidation of storage lesion's features that may serve as a donor's signature, namely 'the donor variation effect'.

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