Differential effects of glycerol and trehalose on RBCs cryosurvival quality

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The sugars glycerol and trehalose have been widely examined as protective agents in the cryopreservation of red blood cells (RBCs). However, the effectiveness of these reagents alone on RBCs remains unclear, indicating the need for further studies aimed to explore the effectiveness of the protective agents on cells functionality. The comparative study has found that RBC survival following cryopreservation in glycerol and trehalose were 37.9±4.6% vs. 54.8±1.7% as measured 24 hours after thawing. Storing the cryosurvival RBCs in standard storing media salt-adenine-glucose and mannitol (SAGM) at low temperature for 10 days showed that the haemolysis percent in cryosurvival RBCs from glycerol vs. trehalose were approximately 60% vs. 29.0±8.4% respectively. The pro-oxidative status in cold storage of protein and lipid was examined. This showed that the protein oxidative damage levels in RBCs stored in SAGM immediately post thawing were 16.49 nmol/ml and 14.99 nmol/ml for the Glycerol (G) and Trehalose (T) freezing conditions. The oxidative damage in RBC lipids was only seen in trehalose cryosurvival RBCs, which was about 1.14±0.125 nmol/106 cells, whereas glycerol had no effect on lipid peroxidation (0.4±0.29 vs. 0.6±0.22 nmol for the fresh RBC control and glycerol freezing conditions respectively). Further enzymatic assessments showed that trehalose is safer than glycerol and it enhanced the stability of thawed cells during cold storage.

Biography
Noha Al-Otaibi is currently a PhD candidate in Biotechnology at the University of Cambridge. Her main research focus is on the cryopreservation of red blood cells. She is the Research Associate at King Abdulaziz City for Science and Technology (KACST). She has experience in cell biology, molecular biology and biochemistry. She has also participated in the Saudi National projects The Date Palm Genome and The Saudi Human Genome and was elected by the Saudi Ministry of foreign affairs to represent the Country in different international events.

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