Sumbawa black honey potency as a potential cyropreservative additive for hematopoetic stem cells (HSC) cryostorage


Background & Aim

Cryopreservation or freezing (banking) HSC opens opportunities for future clinical applications (autologous HSC transplantation) or for parents and siblings (allogeneic HSC transplants). In the cryopreservation process, the cell is transferred into the cryo medium. Cryo medium comprises of basal medium added with a diluent medium (mainly fetal bovine serum, human serum albumin or umbilical cord blood serum) and DMSO cryoprotectant agent. DMSO is toxic to cells at room temperature and during transplant to the patient's body. Reports of side effects that arise include symptoms in the gastrointestinal tract, heart and blood vessels such as nausea, vomiting, ECG abnormalities, bradycardia and hypotension. DMSO is used in concentrations of 5% or 10% as cryoprotectant. DMSO concentration of 2% or less decreases the cell membrane integrity so that the cells are susceptible to lysis thus low cryopreservative potency. Extracellular cryoprotectants such as sucrose or trehalose combined with DMSO can reduce DMSO concentrations to 2.5%. This can reduce the toxicity caused by the DMSO cryoprotectant formula. Sumbawa black honey is a local product by Sumbawa honey farm that is known to contain high sucrose. This study aims to investigate the potency of Sumbawa black honey as cryopreservative additive to lower the concentration of DMSO in the cryo medium thus limit the toxicity potential.
Methods, Results & Conclusion

This is an experimental in vitro study from November 2018 until February 2019. The protocol has been approved by ethical committee Faculty of Medicine Universitas Indonesia and UCB donors have signed informed consent of the study. Enriched CD34+ hematopoetic stem cells were obtained by MACS CD34+ separation after ficoll density centrifugation. Cell count performed using trypan blue exclusion methods. Flow cytometry analysis of CD34+ cells were performed after isolation and after thawing. Cryo medium composed of RPMI 1640, 10% DMSO and 10% UCB serum was used as control. Cryo medium composed of RPMI 1640, 10% UCB serum and either 5% DMSO or 2.5% DMSO added with 5% or 7.5% filtered Sumbawa black honey (for a total percentage of cryopreservative agent 10%).