

Selaginella bryopteris Aqueous Extract Improves Stability and Function of Cryopreserved Human Mesenchymal Stem Cells

Singh A., Jha A., Bit A., Kiassov A., Rizvanov A., Ojha A., Bhoi P., Patra P., Kumar A., Bissoyi A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017 Abhishek Kumar Singh et al. The effective long-term cryopreservation of human mesenchymal stem cells (MSCs) is an essential prerequisite step and represents a critical approach for their sustained supply in basic research, regenerative medicine, and tissue engineering applications. Therefore, attempts have been made in the present investigation to formulate a freezing solution consisting of a combination of *Selaginella bryopteris* water-soluble extract with and without dimethyl sulfoxide (Me₂SO) for the efficient long-term storage of human umbilical cord blood- (hUCB-) derived MSCs. The cryopreservation experiment using the formulated freezing solution was further performed with hUCB MSCs in a controlled rate freezer. A significant increase in postthaw cell viability and cell attachment of MSCs was achieved with freezing medium containing *Selaginella bryopteris* water extract along with 10% Me₂SO as compared to the freezing medium containing Me₂SO (10% v/v) alone. Furthermore, the decreasing apoptotic events and reactive oxygen species production along with increasing expression of heat shock proteins also confirmed the beneficial effect of *Selaginella bryopteris* water extract. The beneficial effect of *Selaginella bryopteris* water extract was validated by its ability to render postpreservation high cell viability. In conclusion, the formulated freezing solution has been demonstrated to be effective for the standardization of cryopreservation protocol for hMSCs.

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