Basic Fibroblast Growth Factor Enhances the Expansion and Secretory Profile of Human Placenta-derived Mesenchymal Stem Cells

Shalini Vellasamy1,4, Sharmili Vidyadaran1, Elizabeth George2, Rajesh Ramasamy1,3,*

1 Immunology Laboratory, Department of Pathology, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia
2 Haematology Unit, Department of Pathology, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia
3 Stem Cell Research Laboratory, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia
4 Department of Biomedical Science, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia

* Corresponding author’s email: rajesh@upm.edu.my

Mesenchymal stem cells (MSCs) hold great therapeutic potential for regenerative medicine and tissue engineering due to inherent immunomodulatory and reparative properties. Hence, it necessitates a readily available supply of MSCs to meet the clinical demands adequately. The current study has explored the feasibility of basic fibroblast growth factor (bFGF) to enhance the growth of placenta-derived MSCs (PLC-MSCs). The effects of bFGF on morphology, growth kinetics and cytokine secretion of PLC-MSCs were assessed. The bFGF supplementation increased the proliferation of PLC-MSCs in a dose-dependent manner, and 40 ng/ml showed a high tropism effect on PLC-MSC’s growth. In the presence of bFGF, PLC-MSCs acquired a small and well-defined morphology that reflects an active proliferative status. bFGF has induced PLC-MSCs to achieve a shorter doubling time (45 hrs) as compared to the non-supplemented PLC-MSCs culture (81 hrs). Furthermore, bFGF impelled PLC-MSCs into cell cycle machinery where a substantial fraction of cells was driven to S and G2/M phases. Amongst, 36 screened cytokines, bFGF had only altered the secretion of IL-8, IL-6, TNFR1, MMP3 and VEGF. The present study showed that bFGF supplementation promotes the growth of PLC-MSCs without significantly deviating from the standard criteria of MSCs.