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

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Introduction: 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. Although a human placenta can produce MSCs, the *in vitro* culture-mediated cellular senescence often affect the quality of cell product. Thus, the current study has explored the feasibility of basic fibroblast growth factor (bFGF) to enhance the growth of placenta-derived MSCs (PLC-MSCs). **Methods:** The basic fibroblast growth factor (bFGF) was supplemented to optimise the growth of MSCs. The effects of bFGF on morphology, growth kinetics and cytokine secretion of PLC-MSCs were assessed. **Results:** The bFGF supplementation increased the proliferation of PLC-MSCs in a dose-dependent manner and 40 ng/ml showed a high trophism 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. **Conclusion:** The present study showed that bFGF supplementation promotes the growth of PLC-MSCs without significantly deviating from the standard criteria of MSCs. Thus, bFGF could be considered as a potential mitogen to facilitate the large-scale production of PLC-MSCs.

Keywords
Basic fibroblast growth factor, Placenta, Mesenchymal stem cells, Cell cycle, Cytokine secretion