Generation and characterisation of human mesenchymal stem cells derived from umbilical cord and placenta

ABSTRACT

Mesenchymal stem cells (MSC) have emerged as a great therapeutic potential in regenerative medicine and tissue engineering, hence created a vast demand for its large clinical scale production. In current study, we have generated MSC from human umbilical cord and placenta tissues that are easily accessible and direct comparisons were made in opting for a better alternate source of MSC in replacement of bone marrow.

MSC were successfully generated, assessed for the morphological changes; surface protein expression via immunophenotyping; early embryonic stem cell (ESC) transcriptional factor expression via RT-PCR and mesodermal differentiation ability.

UC-MSC and PLC-MSC appeared fibroblastic-like cells and expressed the common mesenchymal surface markers. Both MSC expressed the ESC markers and were able to differentiate into adipocytes, osteocytes and chondrocytes upon induction. In comparison, UC-MSC showed a significantly rapid growth kinetic with higher cell yield and shorter doubling time as compared to PLC-MSC.

In our findings, both UC-MSC and PLC-MSC shared similar mesenchymal markers and properties however; UC-MSC appears as a better source of MSC as they display superior differentiation potential and growth kinetics than PLC-MSC.

Keyword: Mesenchymal stem cells; Umbilical cord; Placenta; Immunophenotyping; Growth kinetics