Differentiation of male germ cells from human umbilical cord blood derived mesenchymal stem cells

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Rationale: Modelling the process of spermatogenesis is significant in elucidating important mechanisms such as reduction in ploidy, chromatin repackaging, initiation of motility, expression of different genes etc. Stem cell researchers are accumulating more data favouring towards the hopes of infertile males.

Aim: To differentiate male germ cells using mesenchymal stem cells (MSCs) isolated from human umbilical cord blood.

Methodology: MSCs from umbilical cord blood were isolated, expanded and characterized using standard protocols. The cells at the second passage were induced with 10 µM All Trans Retinoic Acid (ATRA) for two weeks. Stage specific genes expressed or suppressed at pre-meiotic, meiotic and post-meiotic stages were detected using Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) technique, before and after the ATRA treatment. Morphological changes were assessed microscopically.

Results: OCT4 a stem cell marker, and PLZF an early Spermatogonial Stem Cells (SSCs) marker, were down regulated during the induction period. Expression of other germ cell markers; pre-meiotic (Stra8), meiotic (Scp3) and post-meiotic (Acr, Prm1, Tekt1) were up regulated. However, morphological changes related to specific cell lineage were difficult to differentiate.

Conclusion: Human cord blood derived MSCs can differentiate in to germ like cells without genetic manipulation. Further studies are designed to improve the efficacy of the culture system using sertoli cells and hormones.

Key words: Cord blood, MSCs, ATRA, Male germ cells.