Immunosuppresive activity of human umbilical cord and placenta derived mesenchymal stem cells on lymphocyte proliferation

Abstract

Current research in mesenchymal stem cells (MSC) concur its potential to be used in therapies to treat various inflammatory diseases and degenerative disorders. In the present study, human umbilical cord (UC) and placenta (PLC) derived MSC were generated and their immunosuppressive activity was assessed using human adaptive and innate lymphocytes. CD3/CD28 micro-beads activated T cells, pokeweed stimulated B cells and NK-92MI cell lines were cultured in the presence or absence of UC-MS and PLC-MSC. The proliferation and cell cycle status of responder cells was measured by tritiated thymidine assay and flow cytometer analysis respectively. Both, UC-MSC and PLC-MSC significantly exerted a significant dose dependent inhibition on lymphocytes proliferation. Further cell cycle analysis showed that T cells were arrested at G0 phase and NK-92MI cells were halted at G1 by preventing them transit from G1→ S phase ($p<0.05$). Transwell assay revealed that the immunosuppressive activity of MSC was mediated by a direct cell-to-cell contact than soluble factors ($p<0.05$). Although both UC and PLC derived MSC exerted a profound anti-proliferative activity on lymphocytes yet UC-MSC express the higher magnitude of immunosuppression in all tested assays.

Keyword: Umbilical cord; Placenta; Mesenchymal stem cells; Immunosuppresion; Immune cells