Mesenchymal stem cells (MSCs) are multipotent cells that have the ability to differentiate along multiple mesenchymal lineages and are a promising cell type for tissue engineering and cell-based therapy. Recent findings also show that MSCs display immunomodulatory properties. Allogeneic MSCs can down-regulate T-cell proliferation as well as monocyte/macrophage activation cytokine production. However, the clinical use of bone marrow-derived MSCs has presented many problems, including pain, donor-site morbidity, low cell yields upon harvest, and decrease of differentiating potential with age. Therefore, the search for alternative sources of MSCs is of significant value.

Characteristics of T-MSCs. (A) Morphology of T-MSCs at initial passage. (B) Immunophenotypic profile of T-MSCs. (C) Clonogenicity of T-MSCs. (Top) Control T-MSC cultures maintained in basal culture medium; (Bottom) Induced T-MSC cultures. (D) Osteogenesis – ALP and COL9 expression 3 weeks after induction. GAPDH: RNA loading control.

Figure 2. Surface immunophenotype of T-MSCs. (A) Flow cytometric analysis of CD4 surface antigen profiles of T-MSCs and BM-MSCs. (B) BM-MSCs. BM-MSCs were stained using fluorescently labeled monoclonal antibodies specific for CD4 (FITC), CD44, CD90, CD105, and CD11b (PE). The x-axis represents expression of each epitope as measured by a mean fluorescence intensity. (C) Representative flow cytometry histogram. Control represents fluorescence due to the isotype control.

Figure 3. T-MSCs inhibit allogenic T cells as PHA-induced proliferative response in a dose dependent manner regardless of the species of T cells. Responding PBMC (10^5 cells) were incubated for 3 days with either 5 µg/ml PHA or allogeneic stimulating PBMC (20:1 ratio) with or without BM-MSC (5x10^4 or 5x10^5 cells/well). (A) PHA-induced proliferation of T cells from different species of donors were inhibited by BM-MSCs. (B) Allogeneic human lymphocytes were inhibited in a dose-dependent manner by BM-MSCs (5x10^4 and 5x10^5 cells/well), but the inhibition was not statistically significant. (C) Dose-dependent inhibition of allogenic T cell proliferation. (D) Comparison of BM-MSC and T-MSC inhibition of allogenic T cell proliferation. (E) Dose-dependent inhibition of allogenic T cell proliferation is similar in both BM-MSCs and T-MSCs. (F) Dose-dependent inhibition of allogenic T cell proliferation is similar in both BM-MSCs and T-MSCs.

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