

Curr Stem Cell Res Ther 2011 Jun;6(2):105-14

PMID: 21190535

DOI: 10.2174/157488811795495440

Effect of platelet lysate on the functional and molecular characteristics of mesenchymal stem cells isolated from adipose tissue

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Abstract

Background: Mesenchymal stem cells (MSCs) are non-hematopoietic, adult, fibroblast-like, multipotent cells that are plastic adherent in standard culture conditions. They can be isolated from several tissues, but it is always necessary to expand them for clinical practice.

Aim: We investigated the effect of human platelet lysate (hPL) on the expansion of human MSCs isolated from adipose tissue (AT), comparing it with fetal bovine serum (FBS) and human platelet-poor plasma (hPPP).

Materials and methods: Human AT-MSCs, hPL and hPPP were obtained from 7 healthy subjects. AT-MSCs were seeded at 1500 cells/cm² and cultured in Dulbecco's modified Eagle's medium supplemented with 10% FBS, 10% hPPP or 10% hPL. Cells were harvested, counted and analyzed by flow cytometry every 7 days for 5 passages (P). The differentiation assays, RNA isolation and co-culture with allogeneic lymphocytes were performed at the end of P2.

Results: AT-MSCs achieved a better proliferation rate when cultured with hPL than with hPPP or FBS (20 ± 2 versus 8 ± 3 and 6 ± 3, respectively, at the end of P5 [p < 0.01]). hPL preserved the differentiation capacity and typical expression of surface antigens, avoiding the risks associated with the use of animal derivatives. AT-MSCs demonstrated a stronger inhibitory effect on lymphocyte proliferation with hPL than with other culture conditions, even at a AT-MSCs:T cells ratio of 1:10. The transcriptional level of matrix metalloproteinase 2, used to evaluate stemness, was very high in all conditions tested.

Conclusions: hPL represents an effective and safe supplement for MSC expansion to be used in the clinical setting.