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.

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