Study of Mir-29a expression in human adipose-derived mesenchymal stem cells treated by platelet-rich plasma

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Introduction:

Mesenchymal stem cells (MSCs) have differentiation capacity to multi lineage cells, such as osteoblasts. As has been reported recently, osteogenic differentiation can be regulated by microRNAs. Although platelet-rich plasma (PRP) is used in the osteogenic differentiation process, the molecular mechanism of the effect of PRP on the induction of osteogenic differentiation by microRNAs is not well understood. We evaluated the effect of PRP on the expression of mir-29a as a key microRNA on the osteogenic differentiation process of hMSCs.

Methods and Results:

Mesenchymal cells were isolated from human adipose tissue and differentiated into osteoblasts. The effects of 10% PRP on bone differentiation evaluate by alkaline phosphatase activity and calcium deposition. We also evaluated gene expression of Runx2 and OPN along with the expression of mir-29a by Real-time PCR. Adipose-derived cells with differentiation potential to adipocyte and osteoblast cell lines, show significant increase in osteoblast differentiation rate, enzyme activity, mineralization upregulation of the mir-29a and gene markers when treated by 10% PRP.

Conclusion:

The present study showed that micro-RNAs such as mir-29a seem to play an active role in the process of bone differentiation during PRP treatment, which in turn affects the signaling pathways of mesenchymal stem cells. Determining the signaling pathways of PRP effect on osteogenic differentiation can optimize the use of this substance in the cell therapy for bone injury and fracture.

Key words: Platelet- Rich Plasma, Mesenchymal stem cells, MicroRNAs, mir-29a, Osteoblasts.