

## Combination of herbal extracts and platelet rich plasma induced dermal papilla cells proliferation: Involvement of ERK and AKT pathway

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**Background and Aims:** Recently, platelet-rich plasma (PRP) has attracted attention in various medical fields, including plastic surgery, treatment of problematic wounds and dermatology. Specifically PRP has been tested during hair transplantation to reduce swelling and pain and to increase hair density. We examined the effects of PRP and herbal extracts combination in order to identify potential stimulants of hair growth.

**Methods:** PRP was prepared using the double-spin method and applied to dermal papilla cells (DPCs). MTT viability test and BrdU Cell Proliferation Assay were used to study the cell proliferation effect of herbal extracts and PRP in DPCs. To understand the mechanisms of herbal extracts and PRP on hair growth, we evaluated signaling pathways and measured the expressions of ERK, Akt, by Western blot.

**Results:** Combination of Herbal extracts and PRP were found to induce significant proliferation of human DPCs at concentrations ranging from 1.5% to 4.5%. The present study show that herbal extracts and PRP affects the expressions of extracellular signal-regulated kinase (ERK) and Akt in DPCs.

**Conclusions:** In this study, we have shown that combination of herbal extracts and PRP plays an active role in promoting the proliferation of human dermal papilla (DP) cells via the regulation of ERK and Akt proteins, and this may be applicable to the future development of herbal extracts and PRP combination therapeutics to enhance hair growth.

**Keywords:** Platelet-rich plasma; Herbal extracts; Dermal papilla cells; Proliferation