

### B-3. The effect of safflower seed fraction extract on human periodontal ligament fibroblast and MC3T3-E1 cell in vitro

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Recently, use of natural medicine is getting more attention, and some of them are believed to be effective in the treatment of periodontitis.

Among them, the seeds of safflower (*Carthamus tinctorius L.*) have been proven to be effective through its use in bone diseases such as fracture and osteoporosis. During the last few years, studies using the seeds of safflower grown in Korea have been active, and it has been reported that safflower seed extract increase the proliferation and the alkaline phosphatase (ALP) activity of human periodontal ligament fibroblast (hPDLF), osteoblast, and that they promote the mineralization process. In animal studies, when safflower seed extract were administered orally new bone formation was promoted.

Recently, in an effort to find out the most effective osteogenic components, among many components of the safflower seed, various safflower seed fraction extracts were obtained by multistep extraction of the safflower components using various solvents. Among these, saf-M-W fraction extracted by methanol and water, is reported to be most effective in increasing osteogenic potential of osteoblasts.

In this study, the effect of safflower seed fraction extract, saf-M-W, on the growth and differentiation of hPDLF and MC3T3-E1 cell was investigated. The toxicity of saf-M-W on both cells was measured using MTT test, and ALP activity was measured using the colorimetric assay of hPDLF. In addition, in MC3T3-E1 cells, the expression of ALP, bone sialoprotein (BSP) mRNA was observed using Northern blot, and the mineralized nodule formation was observed using von Kossa dye and phase-contrast microscope.

1. In concentrations below  $10\mu\text{g/ml}$ , saf-M-W didn't show any toxicity on hPDLF and MC3T3-E1 cell.
2. The change in saf-M-W concentration had no effect on the ALP activity of hPDLF.
3. In MC3T3-E1 cells, mRNA expressions of ALP and BSP were greater in the experimental group treated with  $10\mu\text{g/ml}$  concentration of saf-M-W compared to the control group.
4. In MC3T3-E1 cells, abundance of mineralized nodules were formed in the experimental group treated with  $10\mu\text{g/ml}$  concentration of saf-M-W, while no mineralized nodule was formed in the control group.

These results suggest that safflower seed fraction extract, saf-M-W, didn't show any toxicity on hPDLF and MC3T3-E1 cell at concentrations below  $10\mu\text{g/ml}$  and effectively enhanced the differentiation and osteogenic potential of MC3T3-E1 cell.