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## Herbal Extracts of *Carthamus tinctorius* L. on Skin-Whitening Effect 中藥草紅花萃取物之美白功效

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### Abstract

**Background and Purpose:** The flower of the safflower, *Carthamus tinctorius* L., is utilized for producing herbal medicines, food colorants, and a natural red dye in oriental countries. The extent to which this herbal medicine is useful to skin cells, however, the mechanism underlying its skin-whitening effect is poorly understood. In this report, we demonstrate the safety concentrations and skin-whitening effects of the methanol extract (CT-Ndef), the *n*-Hexane extract (CT-F) and the defatted with *n*-Hexane extract (CT-Def) and compare the results with those two known natural skin-whitening agents, arbutin and L-ascorbic acid.

**Methods:** MTS assay for cell viability by three extracts, arbutin and L-ascorbic acid in premalignant keratinocytes HaCaT and B16 cells were assessed. Mushroom tyrosinase activity, cellular tyrosinase activity and melanin content were indications for evaluation.

Tyrosinase activity and the expression of melanin synthesis related gene and protein expressions in B16 cells treated with the extracts, arbutin and L-ascorbic acid were also tested by reverse transcriptase-PCR, immunofluorescence, western blot and quantitative analysis of fluorescent staining analysis.

**Results:** The cytotoxic effect was not observed after treated with three extracts until almost 500 g/ml concentration, especially CT-Def shows non-toxic effect in HaCaT and B16 cells. These constituents were evaluated their ability to inhibit cellular tyrosinase activity and for their melanin inhibitory activity in B16 cells.

Additionally, RT-PCR analysis disclosed that expression of mRNAs for melanocyte-stimulating hormone binds to its specific receptor (MC1R), microphthalmia-associated transcription factor (MITF), tyrosinase and tyrosinase-related proteins 1 and 2 (TRP-1 and TRP-2) were suppressed by extracts.

Immunofluorescence and western blot analysis revealed that expression of MC1R, MITF, tyrosinase, TRP-1 and TRP-2 were decreased in extracts-treated B16 cells.

**Conclusions:** Extracts of *C. tinctorus* exhibited depigmentation activity and that this inhibition is exerted through inhibition of MC1R, MITF, tyrosinase, TRP-1 and TRP-2 expressions, and may thus serve as a potentially effective skin-lightening agent in the further.