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Stimulation of melanogenesis by *Carthamus tinctorius* floret extract in B16F10 murine melanoma cells

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Introduction: Hair pigmentation is a process of hair growth and occurs through melanogenesis in follicular melanocyte. Melanogenesis, melanin producing process, is induced by a melanogen such as α-melanocyte stimulating hormone and regulated by melanogenic enzymes such as tyrosinase, tyrosinase-related protein (TRP-1) and TRP-2. Gray hair is the result from the deficiency of melanogenesis and becomes a medical problem when it is excessive, premature and distressing to patient. The effective treatment for gray hair is currently becoming hot issue of research. **Method:** In this study, the effect of *Carthamus tinctorius* floret ethanolic extract (CTE) on melanogenesis was examined in B16F10 murine melanoma cells. Melanin content was analyzed spectrophotometrically and the expression of tyrosinase, TRP-1 and TRP-2 were investigated by reverse transcription-polymerase chain reaction. **Results:** Results showed that CTE had a significant stimulative effect on melanogenesis in B16F10 cells due to the melanin content was greatly increased by CTE in a dose-dependent manner with no cytotoxicity at the effective concentrations. In addition, tyrosinase, TRP-1 and TRP-2 level were increased and also the viability of B16 cells was higher than 80% after 48 h treatment with CTE at doses of 6.25 to 25 µg/ml. **Conclusion:** These results indicate that CTE can stimulate melanogenesis at the transcriptional level without cytotoxicity. Therefore, CTE appears to be a good candidate for gray hair treatment product.

Keywords: *Carthamus tinctorius*, B16F10 murine melanoma cells, melanogenesis, tyrosinase

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Hair growth promotion, cytotoxicity and skin permeability evaluations of *Carthamus tinctorius* floret extract

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Introduction: *Carthamus tinctorius* L., a member of the family Compositae, is a Thai plant traditionally used for hair treatment. Our previous studies showed that C. tinctorius floret ethanolic extract (CTE) could stimulate the hair growth-related gene and suppress the hair loss-associated gene expression in dermal papilla cells. Furthermore, this plant extract promoted the growth of hair in mice. **Method:** In this study, the effect of CTE on the length of cultured hair follicle was examined. Moreover, the toxicity of CTE on keratinocytes (HaCaT), melanocytes (B16F10) and dermal papilla cells (DPCs) was investigated. Besides, the skin permeability of CTE also was measured. **Results:** The results revealed that CTE showed a significant increase in length of cultured hair follicles. For cytotoxic assay, after 24 h incubation the cultured cells were evaluated by using MTT assay, the high IC_{50} of CTE on HaCaT, B16F10 and DPCs were 2.19±0.11, 3.62±0.69, and >5.00 mg/ml, respectively. The permeability of CTE from side by side diffusion cell method through porcine skin over 24 h was measured with UV-HPLC, the permeation rate in water vehicle of hydroxysafflor yellow A, a chemical component of CTE, was 82.01 µg/cm^2/ h. When the enhancers including propylene glycol and ethanol were added in the vehicle, the permeation rate raised up to 141.44 µg/cm^2/ h. **Conclusion:** The results suggest that CTE has potential as a safe hair growth promoter with high skin permeation and it is suitable for further development as a topical agent.

Keywords: *Carthamus tinctorius*, hair growth promotion, cytotoxicity, skin permeation

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