

# Anti-melanogenic Effects of Anthocyanin-enriched Polyphenols from *Hibiscus syriacus* L. by Activating the ERK Signaling Pathway

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## Abstract

*Hibiscus syriacus* L. exhibited potential as a new source of food and colorants containing various anthocyanins. However, the function of anthocyanins from *H. syriacus* L. has not been investigated. In the current study, we evaluated whether anthocyanins from the *H. syriacus* L. varieties Pulsae and Paektanshim (PS and PTS) inhibit melanin biogenesis. B16F10 cells and zebrafish larvae were exposed to PS and PTS in the presence or absence of  $\alpha$ -melanocyte-stimulating hormone ( $\alpha$ -MSH), and melanin contents accompanied by its regulating genes and proteins were analyzed. PS and PTS moderately downregulated mushroom tyrosinase activity *in vitro*, but significantly decreased extracellular and intracellular melanin production in B16F10 cells, and inhibited  $\alpha$ -MSH-induced expression of microphthalmia-associated transcription factor (MITF) and tyrosinase. PS and PTS also attenuated pigmentation in  $\alpha$ -MSH-stimulated zebrafish larvae. Furthermore, PS and PTS activated the phosphorylation of extracellular signal-regulated kinase (ERK), whereas PD98059, a specific ERK inhibitor, completely reversed PS- and PTS-mediated anti-melanogenic activity in B16F10 cells and zebrafish larvae, which indicates that PS- and PTS-mediated anti-melanogenic activity is due to ERK activation. Moreover, chromatography data showed that PS and PTS possessed 17 identical anthocyanins as a negative regulator of ERK. These findings suggested that anthocyanins from PS and PTS inhibited melanogenesis *in vitro* and *in vivo* by activating the ERK signaling pathway.

**Keywords:** *Hibiscus syriacus* L., anthocyanin, melanin, tyrosinase, ERK

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