

## **Anthocyanins from *Hibiscus syriacus* Inhibit Melanogenesis by Activating the ERK Signaling Pathway**

**Wisurumuni Arachchilage Hasitha Maduranga Karunarathne<sup>1</sup>,  
Ilandarage Menu Neelaka Molagoda<sup>1</sup>, Sang Rul Park<sup>1</sup>, Jeong Woon Kim<sup>2</sup>,  
Oh-Kyu Lee<sup>2</sup>, Hae Yun Kwon<sup>3</sup>, Matan Oren<sup>4</sup>, Yung Hyun Choi<sup>5</sup>, Hyung Won Ryu<sup>6</sup>,  
Sei-Ryang Oh<sup>6</sup>, Wol Soon Jo<sup>7</sup>, Kyoung Tae Lee<sup>2\*</sup> and Gi-Young Kim<sup>1\*</sup>**

<sup>1</sup>Department of Marine Life Sciences, Jeju National University

<sup>2</sup>Forest Biomaterials Research Center, National Institute of Forest Science

<sup>3</sup>Forest Tree Improvement Division, Bioresources Research Center, National Institute of Forest Science

<sup>4</sup>Department of Molecular Biology, Ariel University

<sup>5</sup>Department of Biochemistry, College of Oriental Medicine, Dong-Eui University

<sup>6</sup>Natural Medicine Research Center, Korea Research Institute of Bioscience and Biotechnology

<sup>7</sup>Department of Research Center, Dong Nam Institute of Radiological and Medical Sciences

*Hibiscus syriacus* exhibited promising potential as a new source of food and colorants containing various anthocyanins. However, the function of anthocyanins from *H. syriacus* has not been investigated. In the current study, we evaluated whether anthocyanins from the *H. syriacus* 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.

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\*(Corresponding author) E-mail: leekt99@korea.kr (K.T.L.), Tel: +82-55-759-8231

E-mail: immunkim@jejunu.ac.kr (G.-Y.K), Tel: +82-64-754-3427