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Role of AMP-activated protein kinase signaling in melanocytes

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Melasma is a common facial hyper-pigmentary disorder presenting in the dermatological clinic. Adiponectin is an important secreted adipokines including skin. Several studies have demonstrated the dermatologic beneficial effect of adiponectin which lowers obesity and diabetes by increasing insulin sensitivity via AMP-activated protein kinase (AMPK) pathway. In our recent microarray data, adiponectin decreased in the lesion of melasma on the face. And it inhibits melanogenesis by increasing AMPK/cAMP response element-binding protein (CREB) regulated transcriptional co-activator (Crtc) phosphorylation. Thus, we investigated the effect of adiponectin and AICAR, a cell permeable activator of AMPK in melanocytes and keratinocytes. We showed that adiponectin and AICAR reduced melanin content, MITF, tyrosinase, TRP-1 and TRP-2 via AMPK/CREB regulated transcriptional co-activator (Crtc) inhibitory phosphorylation in normal human and mouse melanocytes. This anti-melanogenic effect was correlated with decreased transcriptional activity of CREB and lentivirus-mediated knockdown of Crtc decreased MITF, tyrosinase, TRP-1 and TRP-2. The de-pigmenting effect of adiponectin was mediated via AMPK activation, which induced the inhibitory phosphorylation of CREB-regulated transcription co-activators (CRTCs) and subsequent suppression of the novel CRTC/CREB pathway in melanocytes. These findings emphasize the dermatologic beneficial effects of adiponectin and AMPK activators and suggest a clinical strategy for using its analogues in the treatment of melasma and post-inflammatory hyperpigmentation after acute skin injury.

Biography

Hanju Yoo completed her Master degree at University of Ulsan College of Medicine, Department of Biomedical Sciences (2014-2016). She was a Researcher at Asan Institute for Life sciences, Department of Dermatology (2016-2017). She is pursuing PhD at University of Ulsan College of Medicine in the Department of Dermatology. Her on-going project is about 'Development of topical agents based on AMPK/MITF regulation of adiponectin in the treatment of skin hyper-pigmentary disorders and hyper-pigmented scars'. Recently, she published paper with Dr. Seunghyun Bang on pigment cell and melanoma research, novel regulation of melanogenesis by adiponectin via the AMPK/CRTC pathway.

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