PHOTOTHERAPY, PHOTODYNAMIC THERAPY

LIGHT-EMITTING DIODE 585 NM PHOTOMODULATION INHIBITING MELANIN SYNTHESIS AND INDUCING AUTOPHAGY IN HUMAN MELANOCYTES

L Chen [(1)]

Fudan University, Dermatology, Shanghai, China [(1)]

Background: Melasma is a common hyperpigmentation skin disease on face. Light-emitting diode (LED) photomodulation 585 nm is reported to be effective for the treatment of melasma. However, whether and how LED photomodulation would influence melanogenesis of human epidermal melanocytes (HEMs) is unknown.

Objective: To evaluate the effects of LED photomodulation 585 nm on melanogenesis in HEMs.

Methods: HEMs were irradiated with fluences of 0, 5, 10 and 20 J/cm2 585 nm LED light. After 5-day treatment, cell viability was analyzed by CCK-8 assay, and apoptosis was assessed by Annexin V APC assay. Melanin content and tyrosinase activity were measured by spectrophotometer. Melanosome stage and autophagosomes were determined under TEM. The formation of autophagic punctate structures was observed under confocal microscope. RT-PCR and western blotting were used to assess the expression of relative mRNA and protein levels.

Results: Yellow light LED 585 nm 20 J/cm2 had no effects on HEMs cell viability and apoptosis. Treatment with LED 585 nm 20 J/cm2 inhibited melanosome maturation, decreased melanin content and tyrosinase activity. Inhibition was accompanied by the decreased expression of TYR, TRP-1 and MITF on both mRNA and protein levels. Autophagosomes were observed under TEM. Autophagic punctate structures of microtubule-associated protein LC3 were induced by LED 585nm. The configuration change of LC3 from LC3-I to LC3-II, and the degradation of p62 protein were observed after LED 585nm. Furthermore, we also revealed that the anti-melanogenic effect of LED 585nm photomodulation was reversed by 3-MA, which inhibits autophagy by blocking autophagosome formation via the inhibition of PI-3K.

Conclusions: Our finding demonstrated that LED 585 nm photomodulation suppressed melanin content in HEMs, and the effect was caused by its dose-dependent inhibition on melanogenesis and the induction of HEMs autophagy. This may provide new insights into

the efficacy of LED photomodulation in the treatment of hyperpigmentation disorders.