PIGMENTATION

SUCROSE DILAURATE SUPPRESSES MELANOSOME TRANSPORTATION AND ACCUMULATION OF ADVANCED GLYCATION END-PRODUCTS VIA AUTOPHAGY ACTIVATION

T Hakozaki [1] - T Laughlin [1] - S Zhao [1] - L Li [1] - J Chen [1] - D Deng [2] - L Moulton [1]

The Procter & Gamble Company, Research & Development, Mason, United States [1] - The Procter & Gamble Company, Research & Development, Singapore, Singapore [2]

Introduction: Hyperpigmentation and accumulation of advanced glycation end-products (AGEs) play a role in the pathogenesis of skin aging and loss of youthful appearance, often described as dull skin, especially among Asian women. Sucrose dilaurate (SDL), a known skin-conditioning compound, is a candidate to reduce them.

Objective: Investigate the effect of SDL on melanogenesis and AGEs accumulation in-vitro, as manifested by facial hyperpigmentation (spots) and changes in basal color among Chinese women.

Materials and Methods: Melanin production and transcriptome analysis using Affymetrix HG-U219 gene array were performed in cultured melanocytes. Keratinocyte transcriptome analysis was also performed. Autophagy activity was quantified in keratinocyte and melanocyte using LC3-II as a marker. Removal of accumulated AGEs was assessed in glyceryl-aldehyde (GLA) pre-treated keratinocytes using a representative AGE, carboxymethyl lysine (CML), as a marker by using LC-MS/MS analysis. Treatments were tested in an 8-week clinical trial including 336 subjects with facial hyperpigmentation. Subjects were assigned to two of seven treatments including 1% SDL and the vehicle moisturizers in a split face, round robin design. Change in spots and skin color were objectively quantified by image analysis of captured facial images.

Results: SDL reduced melanin production in melanocytes. Transcriptome analysis indicated down regulation of melanosome transporter biology like Rab27 within melanocytes. Keratinocyte transcriptome analysis indicated upregulation of autophagy pathway including mTOR down-regulation, confirmed by LC3-II marker assay in keratinocyte, but not melanocyte. Post-treatment of SDL reduced accumulated CML effectively in GLA-pre-treated keratinocyte suggests autophagy activation helps remove AGEs in keratinocyte. In the clinical study, SDL significantly reduced hyperpigmented spots and skin yellowness, and increased skin lightness compared with the vehicle after 8 weeks of use.

Conclusions: SDL is an effective treatment to reduce hyperpigmentation, make skin lighter and less yellow via suppressing melanosome transportation and helping remove AGEs accumulation in keratinocytes potentially by activation of autophagy.