The Suppression of Melanosome Transfer and Its Evaluation

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Abstract

The research on skin-lightening agents was initially focused on the inhibition of tyrosinase, which is a rate-limiting enzyme in melanogenesis. With the advances in UV-melanogenesis research, various approaches such as inhibition of melanogen were developed to address epidermal coloration problems. Here we focused on the melanosome transfer process from melanocytes to keratinocytes, which has been getting an attention in recent few years. The effect of niacinamide on the melanosome transfer was evaluated in a co-culture model established by using fluorescent dye as a marker. In this model, niacinamide effectively suppressed the transferred amount of melanosomes in a dose dependent and reversible manner. We further investigated the effect of topical niacinamide on facial hyperpigmented spot and basal skin color among Japanese females. In two separate clinical studies, high-resolution facial images were captured. Images were then computer analyzed and visually graded to objectively quantify the changes of before and after treatment. The results from both the studies suggested, daily application of niacinamide moisturizer was effective in reducing hyperpigmented spot area and increasing lightness of skin color compared to the placebos. Although the specific mechanism is yet to be determined, these data suggest niacinamide is an effective skin-lightening agent via suppression of melanosome transfer from melanocytes to keratinocytes.

Key words: melanosome transfer, hyperpigmentation, skin-lightening, niacinamide.

1. はじめに

これまでの美白化粧品の色素沈着抑制のメカニズムをたどってみると、はじめはおもにメラノサイト内のチロシナーゼ酵素を阻害することに主眼をおいて研究が進められてきた。やがて紫外線誘導による色素沈着の形成に関する研究が進み、TRP-1やTRP-2といったチロシンアーゼ関連酵素や、alpha-melanocyte stimulating hormone（α-MSH）、endothelin-1、basic fibroblast growth factor、prostaglandin E2、一酸化窒素などのさまざまなmelanogenの役割、またはメラノサイト内でのsignaling pathwayなどが明らかになるにしたがい、さまざまな色素沈着抑制のアプローチが研究されるようになった。さらにこの2、3年の間に、それまであまり研究がなされていなかったメラニンの輸送や

2. メラソームの輸送メカニズム

メラソームは、メラノサイト内で産生される色素顆粒である。メラニンはメラソームのなかで合成され、そのまま色素細胞の枝状突起部に輸送される。最近の知見より、メラソームは成熟にともない、メラノサイトの枝状突起先端部へ向かい、kinesinやmyosinといったモータープロテインの助けでmi...