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Nitric oxide enhances the sensitivity of alpaca melanocytes to respond to alpha-melanocyte-stimulating hormone by up-regulating melanocortin-1 receptor.

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Abstract

Nitric oxide (NO) and alpha-melanocyte-stimulating hormone (alpha-MSH) have been correlated with the synthesis of melanin. The NO-dependent signaling of cellular response to activate the hypothalamopituitary proopiomelanocortin system, thereby enhances the hypophysial secretion of alpha-MSH to stimulate alpha-MSH-receptor responsive cells. In this study we investigated whether an NO-induced pathway can enhance the ability of the melanocyte to respond to alpha-MSH on melanogenesis in alpaca skin melanocytes in vitro. It is important for us to know how to enhance the coat color of alpaca. We set up three groups for experiments using the third passage number of alpaca melanocytes: the control cultures were allowed a total of 5 days growth; the UV group cultures like the control group but the melanocytes were then irradiated everyday (once) with 312 mJ/cm(2) of UVB; the UV+L-NAME group is the same as group UV but has the addition of 300 microM L-NAME (every 6h). To determine the inhibited effect of NO produce, NO produces were measured. To determine the effect of the NO to the key protein and gene of alpha-MSH pathway on melanogenesis, the key gene and protein of the alpha-MSH pathway were measured by quantitative real-time PCR and Western immunoblotting. The results provide exciting new evidence that NO can enhance alpha-MSH pathway in alpaca skin melanocytes by elevated MC1R. And we suggest that the NO pathway may more rapidly cause the synthesis of melanin in alpaca skin under UV, which at that time elevates the expression of MC1R and stimulates the keratinocytes to secrete alpha-MSH to enhance the alpha-MSH pathway on melanogenesis. This process will be of considerable interest in future studies.

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