The effect of diacetyl-α-melanocyte-stimulating hormone on the coloration and expression of related genes in tilapia (Oreochromis mossambicus) chromatophores

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ABSTRACT

Melanocyte-stimulating hormone (MSH) is secreted by the cells in the anterior/intermediate lobe of the pituitary gland and plays a role in stimulating the production and release of melanin by melanocytes which referred to as melanogenesis. MSH is also widely known to increase the amount of dorsal melanophores long term, to disperse chromatophore pigments and to stimulate female sexual activities. Our previous studies revealed that the aggregation and dispersion of male tilapia (O. mossambicus) melanophores were affected by hormones and drug (pituitary adenylate-cyclase activating polypeptide, prolactin, MSH, estradiol, arbutin, and electrical stimulation). However, research on the effect of diacetyl-α-MSH (α-MSH) on tilapia coloration and related gene expression in chromatophores is still scant. Therefore, this study was aimed to analyze the morphology, melanogenesis and related gene expression of primary cultured chromatophores after incubated with various concentrations (1, 10 and 100 nM) of α-MSH. The activity of tyrosinase, the concentration of melanin and cAMP were also analyzed. Results showed that culture with 100 nM α-MSH for 30 minutes might cause significant pigment dispersion in melanophores by Image J evaluation. The mRNA levels of mitf (which is a role of a master regular of melanocyte development and melanoma oncogene), sox10, dct and tyrosinase in the chromatophores detected by semi-quantitative PCR were lower at 1 nM and significantly increased at 100 nM. Same result were found in melanin, cAMP and tyrosinase activity assays. These results suggested that α-MSH may involve in coloration of chromatophores and in the cAMP/CREB (cAMP responsive binding element) /Mitf/Tyrosinase/Dct signaling pathway. The above data can not only for exploring the pigment cells associated disease research and treatment but also for further application on regenerative medicine and biomedical researches.

Keywords: diacetyl-alpha-melanocyte-stimulating hormone (MSH), coloration, tilapia (Oreochromis mossambicus)

REFERENCES