Article

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The stimulatory effect of LED light spectra on genes related to photoreceptors and skin pigmentation in goldfish (*Carassius auratus*)

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Abstract

This study aimed to assess differences in genes related to skin color of goldfish (*Carassius auratus*) exposed to light-emitting diodes (LEDs): red, green, and purple. We investigated differences in the expression of mammalian-like melanopsin (Opn4m), rhodopsin (RH), melanin-concentrating hormone (MCH), melanin-concentrating hormone receptor (MCH-R), and proopiomelanocortin (POMC) in goldfish exposed to different LED light spectra. Opn4m, RH, MCH, and MCH-R mRNA levels were significantly higher in the green and purple LED groups than in the white fluorescent bulb (control) and red LED groups. Furthermore, skin cells were isolated to measure the MCH-R mRNA expression levels. The results show that the mRNA expression levels were significantly higher in the green and purple LED groups than in the control and red LED groups. In addition, body weights in the green and purple LED groups were significantly higher than those in the control and red LED groups. However, POMC mRNA expression levels in the green and purple LED groups were significantly lower than those in the control and red LED groups. These results suggest that specific wavelengths regulate fish skin color through neuropeptide hormones and photoreceptors, and POMC, which is related to stress hormones and melatonin, is associated with stress levels as well as skin color.

Keywords

Melanopsin Melanin-concentrating hormone (MCH) Proopiomelanocortin (POMC) Light-emitting diodes Skin color