



EXPRESSION OF DEEP-BRAIN PHOTORECEPTOR, VERTEBRATE ANCIENT LONG OPSIN, IN THE JAPANESE MEDAKA

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Introduction:

Light plays an important role in the regulation of animal reproduction. Recent advances in genomic information have shown the existence of several non-image-forming photoreceptors in the genome of non-mammalian species [1]. Although it has been known that fish brain itself is a photoreceptive organ, detailed mechanism remains unclear. We hypothesize that medaka brain expresses non-visual photoreceptors to regulate reproduction by light.

Methods:

Primers for RT-PCR were designed based on predicted coding sequence of vertebrate ancient opsin (VALop) in the genomic database. The full-length cDNA of medaka VALop was further obtained by 5'- and 3'-RACE using the cloned partial cDNA sequence. *In situ* hybridization for VALop mRNA in the brain was performed using digoxigenin-labeled RNA probes. The sections were then counterstained with cresyl violet to confirm the position of labeled cells.

Results and Discussion:

Cloned medaka cDNA was about 2.8 kbp in length and contains an open reading frame of 1164 bp. High homology with VALop cDNAs in other animals confirms that the cloned cDNA encodes medaka VALop. The deduced amino acid (aa) sequence contains 387 aa with putative 7 transmembrane domains, which are common to all G protein-coupled receptors including all types of photoreceptors. *In situ* hybridization showed the expression of VALop mRNA in a limited number of neurons that are bilaterally scattered from the area near to the ventral habenula and extended caudally and ventrally.

Conclusion:

In the current study, it is shown that the medaka brain directly receives light information via VALop.

References:

[1] PEIRSON S.N., HALFORD S., FOSTER R.G. 2009. The evolution of irradiance detection: melanopsin and the non-visual opsins. *Philos. Trans. R. Soc. Lond. B Biol. Sci.*, 364:2849-2865