

Characterization of Melanopsin Expression in the Mammalian Epithelium

Abstract

Melanopsin is a non-canonical opsin expressed in a small subset (<2%) of mammalian retinal ganglion cells. Melanopsin confers intrinsic photosensitivity to these retinal ganglion cells, or ipRGCs (Hattar et al., 2002; Fu et al., 2005). Melanopsin was initially cloned from melanophores of the *Xenopus laevis*, where it confers intrinsic photosensitivity to the amphibian epidermis (Kumbalasiri and Provencio, 2005). The melanopsin-dependent photosensitivity of the amphibian epithelium suggests that melanopsin may also be expressed in and mediate photosensitivity of the mammalian skin. This study explores melanopsin expression in the mammalian epithelium.

Strong immunocytochemical staining of HEK293T cells transfected with melanopsin suggests a viable tool for further use in functional assays. RT-PCR of 308 mouse keratinocytes, primary mouse keratinocytes, and HaCaT human keratinocytes shows melanopsin expression at the mRNA level, supported by in situ hybridization of primary mouse epithelium. Immunocytochemistry of primary mouse and rat keratinocytes using two antibodies generated against different epitopes shows membrane-localized melanopsin expression at the protein level, further confirmed using immunohistochemistry of primary mouse and rat epithelial sections. This expression characterization of melanopsin provides the foundation on which to pursue further functional studies that will explore the mechanisms by which melanopsin functions and its physiological roles in the mammalian skin.