

Expression and Localization of Carnitine/Organic Cation Transporter OCTN1 and OCTN2 in Ocular Epithelium

S. Xu¹, Q. Garrett¹, P. Simmons², J. Vehige², M. Willcox¹

¹*Department of Biochemistry, Institute for Eye Research Limited, The University of New South Wales, NSW, Australia*

²*Allergan, Inc., Irvine, CA, United States*

Purpose

Functional evidences demonstrated that a carrier-mediated organic cation transport process appears to exist in the conjunctiva, mediating the absorption of carnitine and organic amines, including certain amine-type ophthalmic drugs. This study was undertaken to investigate the expression and localization of carnitine/organic cation transporter OCTN 1 or OCTN2 in ocular surfaces using human ocular epithelial cell lines and rabbit ocular epithelium tissues.

Methods

Immortalised human corneal-limbal epithelial (HCLE) and conjunctival epithelial (HCjE) cells were cultured in Keratinocyte Serum Free (K-SFM) medium. OCTN1 and OCTN2 mRNA expression was investigated using reverse transcriptase-polymerase chain reaction (RT-PCR) assay. The identity of each PCR product was verified by DNA sequencing. Expression and localization of OCTN1 and OCTN2 at the protein level in ocular epithelial cells and rabbit ocular epithelium was studied by immunocytochemistry and immunohistochemistry, respectively, using polyclonal antibodies from goats raised against the 13 C-terminal amino acids of human OCTN1 or OCTN2. Preimmune rabbit serum was used for negative controls.

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Results

OCTN1 and OCTN2 mRNA expression was detected in both HCLE and HCjE cells and verified by DNA sequence analysis. Immunoreactivity revealed OCTN1 and OCTN2 proteins to be ubiquitously expressed throughout the cell with some apparent accumulation in the cell membrane in both HCLE and HCjE cells. Expression of OCTN1 and OCTN2 in rabbit corneal and conjunctival epithelium was also observed. OCTN2 immunoreactivity in rabbit conjunctival epithelium appeared higher than that in corneal epithelium.

Conclusions

This report is the first to document expression of OCTN1 and OCTN2 in human corneal and conjunctival epithelial cells and in rabbit ocular epithelium tissues. These findings suggest a potential involvement of OCTN1 and OCTN2 in transport of carnitine in ocular tissues. [This research was sponsored by Allergan Inc, USA]

1. Garrett et al. Invest Ophthalmol Vis Sci 2007; 48(4):1559-67
2. Grube et al. Drug Metabolism and Disposition 2005; 33:31-37

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