

ABSTRACT

Recent studies show that exposure to ultraviolet (UV) light suppresses ocular elongation, which causes myopia development. However, the specific mechanisms of this process have not been elucidated. A UV-sensor, Opsin 5 (Opn5) mRNA was shown to be present in extraretinal tissues. To test the possibility that UV-signals mediated by Opn5 would have a direct effect on the outer connective tissues of the eye, we first examined the expression patterns of a mammalian type Opn5 (Opn5m) in the late-embryonic chicken eye. Quantitative PCR showed *Opn5m* mRNA expression in the cornea and sclera. The anti-Opn5m antibody stained a small subset of cells in the corneal stroma and fibrous sclera. We next assessed the effect of UV-A (375 nm) irradiation on the chicken fibroblast cell line DF-1 overexpressing chicken *Opn5m*. UV-A irradiation for 30 minutes significantly increased the expression of *Early growth response 1 (Egr1)*, known as an immediate early responsive gene, and of *Matrix metalloproteinase 2 (Mmp2)* in the presence of retinal chromophore 11-cis-retinal. In contrast, expression of *Transforming growth factor beta 2* and *Tissue inhibitor of metalloproteinase 2* was not significantly altered. These results indicate that UV-A absorption by Opn5m can upregulate the expression levels of *Egr1* and *Mmp2* in non-neuronal, fibroblasts. Taken together with the presence of Opn5m in the cornea

and sclera, it is suggested that UV-A signaling mediated by Opn5 in the extraretinal ocular tissues could influence directly the outer connective tissues of the chicken late-embryonic eye.

Keywords: Opsin 5, UV-absorbing pigment, fibroblasts, chicken, Egr1, Mmp2