

Role of Metalloproteases in Retinal Degeneration Induced by Violet and Blue Light

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Introduction: An essential role for metalloproteases (MMPs) has been described in blood vessel neof ormation and the removal of cell debris. MMPs also play a key role in degenerative processes and in tumors. The participation of these enzymes in light-induced phototoxic processes is supported by both experimental and clinical data. Given that patients with age-related macular degeneration often show deposits, or drusen, these deposits could be the consequence of deficient MMP production by the pigment epithelium.

Purpose: To gain insight into the regulation of metalloproteases in the pathogenesis of retinal degeneration induced by light.

Methods: We examined the eyes of experimental rabbits exposed for two years to circadian cycles of white light, blue light and white light lacking short wavelengths. For the trial the animals had been implanted with a transparent intraocular lens (IOL) and a yellow AcrySof® IOL, one in each eye. After sacrificing the animals, the retinal layer was dissected from the eye and processed for gene expression analyses in which we examined the behavior of MMP-2, MMP-3 and MMP-9.

Results: MMP-2 expression was unaffected by the light received and type of IOL. However, animals exposed to white light devoid of short wavelengths or those fitted with a yellow IOL showed 2.9- and 3.6-fold increases in MMP-3 expression, respectively compared to controls. MMP-9 expression levels were also 3.1 times higher following exposure to blue light and 4.6 times higher following exposure to white light lacking short wavelengths or 4.2 times higher in eyes implanted with a yellow IOL.

Conclusions: Exposure to long periods of light irrespective of its characteristics leads to the increased expression of some MMPs. This alteration could indicate damage to the extracellular matrix and have detrimental effects on the retina.