UVR-B induced cataract is linked to an increased expression of inflammatory cytokines in the lens epithelium in vivo

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Background & Purpose
- Cataract is the most common cause of blindness in the world and there are currently no prevention strategies (McCarty and Taylor 2002).
- Experimental studies showed that UVR-B induced cataractogenesis may be associated with an inflammatory reaction (Meyer, Lofgren et al. 2013).
- There has been some evidence for the neuropeptides monocyte chemotactic protein-1 (MCP-1) and neuropeptide receptor-1 (NKR-1) to modulate ocular inflammation processes (Zhu, Wolff et al. 2015; Casini, Dal Monte et al. 2004).
- The aim of this study was to investigate the influence of UVR-B exposure on the expression of NKR-1 and MCP-1 in the lens epithelium in vivo and thereby to examine if these neuropeptides are involved in inflammatory responses in cataract development.

Methods
- C57Bl/6 mice were exposed in vivo to UVR-B irradiation using a Bio Spectra system (Vilber Lourmat, Germany).
- In one eye the mice received a five-fold cataract threshold equivalent dose (1.45 kJ/m²; 300-nm wavelength region) while the other eye was completely shielded.
- Three and seven days after UVR-B exposure cataract formation was assessed with a Leica dark-field microscope camera system and quantified with a software measuring pixel intensities.
- NKR-1 and MCP-1 levels in lens epithelium lysates were analyzed by ELISA (enzyme-linked immunosorbent assay) for the exposed and also for the contralateral non-exposed eye.

Results
- All UVR-B exposed mice developed cataracts in the exposed eye.
- Pixel intensity was significantly higher in the exposed eye after three and seven days (17 Mio./Pixel 11 Mio. Pixel) compared to the non-exposed eye (<200.000 Pixel).
- MCP-1 levels in the exposed lens epithelium increased following UVR-B exposure at latency periods three (9,71 pg/ml) and seven days (9,70 pg/ml).
- MCP-1 levels in the unexposed eyes did not increase compared to the control group (9,58 pg/ml).
- A significant difference was found for NKR-1 levels between the exposed eye (13,80 pg/ml) and the contralateral eye (13,41 pg/ml) three days after exposure.

Conclusions
- UVR-B induces cataract three and seven days after exposure in vivo.
- Further research on the influence of inflammatory cytokines is needed and it should be explored if possible anti-inflammatory treatments may counteract UVR-B induced cataract development.

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References