Association of Human Hepatitis C Virus (HCV) with Dry Eye Syndrome

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Human hepatitis C virus though primarily affects the liver, and it is known to be a causative agent of dry eye. Among the proteins of HCV, core antigen and non-structural protein 3 (NS3) are the most antigenic proteins of HCV. Toll-like receptors are a family of pattern recognition receptors that play an important role in innate immunity against various pathogens. It is been proved that HCV infection induces toll-like receptor expression, which plays a role in host’s innate immune response.

We studied the effect of HCV core and NS3 antigens in inducing toll-like receptor expression and cytokine release by corneal epithelial cells. Both SV40 immortalized corneal epithelium (Figure 1) exposed to the recombinant HCV core and NS3 antigens showed a higher expression profile for TLR1, TLR2, TLR6 and TLR9. Also, both of the antigens induced the release of proinflammatory cytokines IL-8 and IL-4 (Figure 2).1 Other than the cytokine release, iNOS gene expression was also upregulated (data not shown), which show that there is oxidative stress induction in corneal epithelial cells when they are seeing the HCV proteins. As stated earlier, there are clear literature evidences for the presence of HCV proteins in donor corneal tissues. Our in vitro studies show that corneal epithelium responds and releases inflammatory mediators via toll-like receptor-mediated pathway.

Here in our treatment condition, both HCV core and NS3 induced inflammatory response in corneal epithelium, which we find that can contribute to the pathogenesis of dry eye condition.1 However, HCV RNA has been detected in the tear fluid, but thus far there has been no study on the presence of HCV antigens in the tear samples of chronic HCV patients, and our study demonstrates that HCV antigens could contribute to pathology of dry eye condition. This is a straight forward study which links the presence of HCV RNA and dry eye condition directly, and we have demonstrated the innate immune response and specific signalling mechanisms of cornea when getting exposed to HCV antigens.2 This could be implemented to the in vivo condition where HCV-associated dry eye treatment strategies could be adapted via controlling TLR signal modulation pathways.

Figure 1: Human corneal epithelial cell line was stained for epithelial markers K3 and K12. Scale bar represents 50 µm.

Figure 2:
References
