Research Highlight

A Glimpse at the Next Generation of Biological Eye Drops for Severe Ocular Surface Disease?

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The past decade has seen the emergence of autologous serum eye drops as a valuable tool in the armamentarium of the ocular surface specialist. These have typically been employed when all else has failed and have proven their worth in the management of severe dry eye, chemical injuries, neurotropic keratopathy, and persistent epithelial defect. In this edition of *IOVS*, Oh and collegues[1] give us a glimpse of what could be the next generation of biologic eye drop therapy for severe ocular surface disease: eye drops derived from human mesenchymal stem cell (hMSC)-conditioned medium.

That hMSC can influence inflammation and tissue repair by secretion of paracrine factors is widely recognized.[2] Previous work in the cornea has demonstrated that hMSc can suppress inflammation via the paracrine effects of TNF-α–stimulated gene/protein 6 (TSG 6).[3] In this edition of *IOVS*, Oh et al.[1] describe the effects of hMSC-conditioned medium on cultures of human corneal epithelial progenitor cells (hCEPs) injured by exposure to 20% ethanol for 30 seconds. They found that hMSC-conditioned medium enhanced survival and proliferation, and inhibited apoptosis of injured hCEPs. In addition, hMSC-conditioned medium accelerated epithelial healing in an ex vivo rabbit corneal wound model. Interestingly, the effects were enhanced by preincubating hMSCs with TNF-α, thereby activating them. This was shown to be in part explained by increased concentration of the protein stanniocalcin-1 that inhibits apoptosis and promotes cell survival.

This study contributes to the mounting evidence that conditioned medium from hMSC can have antiapoptotic and/or proepithelial wound healing effects via a paracrine mechanism. The challenge now for researchers in this field is to identify and test the optimum hMSC culture conditions and protocols to produce safe, tolerable, and effective hMSC conditioned eye drops, but without the proangiogenic factors also known to be produced by these cells.

References

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