

# Researchers shed light on repair mechanism for severe corneal injuries

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In cases of severe ocular trauma involving the cornea, wound healing occurs following intervention, but at the cost of opaque scar tissue formation and damaged vision. Recent research has shown that mesenchymal stem cells (MSCs)—which can differentiate into a variety of cells, including bone, cartilage, muscle and fat cells—are capable of returning clarity to scarred corneas; however, the mechanisms by which this happens remained a mystery—until now.

In a study published online today in *Stem Cell Reports*, researchers from Schepens Eye Research Institute of Massachusetts Eye and Ear have identified [hepatocyte growth factor](#) (HGF), secreted by MSCs, as the key factor responsible for promoting wound healing and reducing inflammation in preclinical models of corneal injury. Their findings suggest that HGF-based treatments may be effective in restoring vision in patients with severely scarred corneas.

"Our results show that [mesenchymal stem cells](#), in an inflamed environment, secrete high levels of HGF, which inhibit [scar formation](#) and restore corneal transparency. But if you silence the HGF expression, the stem cells lose their capacity to inhibit scar formation," said senior author Sunil K. Chauhan, Ph.D., an Investigator at Schepens Eye Research Institute of Mass. Eye and Ear and an Assistant Professor of Ophthalmology at Harvard Medical School. "That HGF alone can restore corneal transparency is highly significant, and has tremendous translational implications for developing new treatment modalities."

Trauma to the eye is the leading cause of corneal opacity, leading to 25 million cases of blindness annually. While injury is not a major cause of blindness, it is one of the most common causes of monocular blindness. Current treatments for corneal scarring vary from topical steroids to corneal transplantation. However, there are limitations to these treatments, including increased risk of infection and rejection of transplants.

With the goal of better understanding why MSCs are capable of restoring clarity to scarred corneas, Schepens Eye Research Institute of Mass. Eye and Ear researchers used an animal model of ocular injury. They observed secretion of high levels of HGF from [stem cells](#) at the site of injury. Furthermore, the researchers showed that HGF is solely responsible for the restoration of corneal transparency – an observation that holds promise for developing HGF-based therapy for patients.

"These findings are very exciting, and bring us one step closer to our goal of improving vision in patients with severely damaged corneas following ocular injuries," said Dr. Chauhan.

**More information:** Restoration of Corneal Transparency by Mesenchymal Stem Cells, *Stem Cell Reports*, DOI: [dx.doi.org/10.1016/j.stemcr.2016.09.001](https://doi.org/10.1016/j.stemcr.2016.09.001)

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