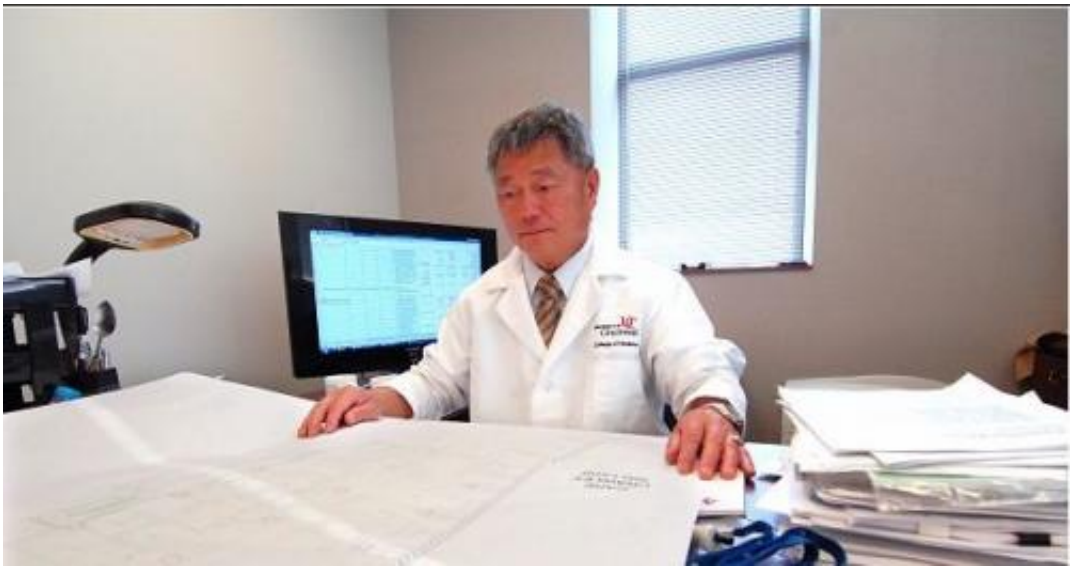
Stem cells have potential to repair diseased corneas

September 18 2014



Professor in the department of opthomology

Corneal transplant (keratoplasty) is a known means of successfully treating corneal disease. However, without unlimited donor corneas, researchers say there is a need to study alternate methods of treatment for eye disease and eye trauma.

One method being studied at the University of Cincinnati (UC) College of Medicine is the transplantation of human umbilical cord mesenchymal stem cells (UMSC) into the cornea stroma.

"We have previously shown that human UMSCs can survive the transplantation and we have now proved that UMSCs reduce inflammation; therefore the injured cornea cells have a chance to repair themselves," says Winston Kao, PhD, principal investigator on the research study, "Umbilical Cord Mesenchymal Stem Cells Suppress Host Rejection" which appears online in the *Journal of Biological Chemistry*, July 2014.

Kao, a professor in UC's department of ophthalmology, says that UMSCs are one of the two types of umbilical cord stem cells that are extremely adaptable and have also been shown to repair bone and cartilage.

As Kao explains it, the UMSC cell is surrounded by a shield that is able to defend against antagonist cells that cause inflammation. In this study, a mouse model where human UMSCs were transplanted into diseased corneal stroma, the treated corneas went from cloudy to clear within a two-week period.

What isn't clear though is the mechanism by which these cells evade host rejection, says Kao, adding:

"The goal now is to analyze the shield and how the cells make it."

Because donor corneas are lessening—in part due to popular laser eye surgery that while restoring sight renders the cornea unusable for transplant—UMSC transplantation has potential as a treatment of both congenital and traumatic inflammatory eye diseases such as Fuchs' dystrophy or chemical burns.

More information: "Umbilical Cord Mesenchymal Stem Cells Suppress Host Rejection: THE ROLE OF THE GLYCOCALYX." Coulson-Thomas VJ, et al. *J Biol Chem*. 2014 Aug 22;289(34):23465-81.

DOI: 10.1074/jbc.M114.557447. Epub 2014 Jul 1.