Stem cells can repair a damaged cornea

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A new cornea may be the only way to prevent a patient going blind – but there is a shortage of donated corneas and the queue for transplantation is long. Scientists at the Sahlgrenska Academy at the University of Gothenburg, Sweden, have for the first time successfully cultivated stem cells on human corneas, which may in the long term remove the need for donators.

Approximately 500 corneal transplantations are carried out each year in Sweden, and about 100,000 in the world. The damaged and cloudy cornea that is turning the patient blind is replaced with a healthy, transparent one. But the procedure requires a donated cornea, and there is a severe shortage of donated material. This is particularly the case throughout the world, where religious or political views often hinder the use of donated material.

Replacing donated corneas

Scientists at the Sahlgrenska Academy, University of Gothenburg, have taken the first step towards replacing donated corneas with corneas cultivated from stem cells. Scientists Charles Hanson and Ulf Stenevi have used defective corneas obtained from the ophthalmology clinic at Sahlgrenska University Hospital in Mölndal. Their study is now published in the journal Acta Ophthalmologica, and shows how human stem cells can be caused to develop into what are known as "epithelial cells" after 16 days' culture in the laboratory and a further 6 days' culture on a cornea. It is the epithelial cells that maintain the transparency of the cornea.

First time ever on human corneas

"Similar experiments have been carried out on animals, but this is the first time that stem cells have been grown on damaged human corneas. It means that we have taken the first step towards being able to use stem cells to treat damaged corneas", says Charles Hanson. "If we can establish a routine method for this, the availability of material for patients who need a new cornea will be essentially unlimited. Both the surgical procedures and the aftercare will also become much more simple", says Ulf Stenevi.

Few clinics conduct transplants

Only a few clinics are currently able to transplant corneas. Many of the transplantations in Sweden are carried out at the ophthalmology clinic at Sahlgrenska University Hospital, Department of Ophthalmology, Mölndal.

More information: The article "Transplantation of human embryonic stem cells onto a partially wounded human cornea in vitro" was published in Acta Ophthalmologica on 27 January. bit.ly/xm3SeM

Provided by University of Gothenburg