

## Stem Cell Therapy: The Holy Grail of Medicine

### For Ophthalmology

Leading organisations using cultured stem cell transplant are LV Prasad Eye Institute (Hyderabad), Sankara Nethralaya (Chennai), AIIMS (New Delhi), and Aditya Jyot Eye Hospital (Mumbai). These institutes grow stem cells in a culture medium in the lab and transplant them to patients suffering from chemical burns and ocular diseases. LV Prasad Eye Institute is the first hospital which has met with success in using cultured stem cells to treat corneal opacity and blindness. They have passed the clinical trial stage and treated over 250 patients with a 70 per cent success rate.

Stem cells exist in various regions of the eye, throughout one's life. So far, stem cells can be found at the outer edges of the cornea (the outer clear part of the eye covering the iris and pupil), the conjunctiva (the thin, moist membranes that covers the inner surface of the eyelids and the outer surface of the eyeball), as well as the ciliary margin (the tissue that lies just behind the iris).

The purpose of corneal or limbal stem cells is to maintain a healthy eye surface and replace cells that are lost and blinked away. The stem cells of the cornea are located at the limbus (the thin area between the clear cornea and the white sclera of the eye). These limbal stem cells can be transplanted for severe eye injuries. During this outpatient procedure, some limbal stem cells are extracted from the healthy eye of the patient (autograft), or a donor's eye (allograft) or cadaver, and then transplanted to the affected eye.

In a successful transplant, limbal stem cells or corneal stem cells will produce a new healthy layer of cells in the patient's eye. The success rate varies from 25 per cent to 70 per cent, depending on the underlying condition of the affected eye.

"The decision to use an autograft or allograft depends on the patient's condition. For example, an autograft would not be possible in a patient diagnosed with aniridia, wherein both eyes would be deficient of limbal stem cells. In cases of a unilateral chemical injury, the normal other eye can be used to harvest the limbal stem cells for cultivation and can then subsequently be transplanted into the affected eye. However, in cases of bilateral chemical burns, the relative with an unaffected eye is a better choice." informs Dr Vandana Jain, Head of Department and Consultant, Cornea, Cataract and Refractive Surgeon, Aditya Jyot Hospital, Mumbai.

Opines Dr Radhika Tandon, Professor of Ophthalmology, Dr Rajendra Prasad Eye Institute of Ophthalmic Sciences, AIIMS, "For corneal transplant, India is on par with any other country in the world."

Currently, research is ongoing on retinal stem cells (stem cells of the retina), where scientists are in the process of trying to culture them in labs. In future, it may help to cure diseases like retinal dispigmentosa, a retinal degeneration for which currently there is no cure.

In another breakthrough research, an Indian institute in collaboration with Japanese Nichi-In Centre for Regenerative Medicine (NCRM) has formed a synthetic culture medium which multiplies corneal limbal stem cells. "For the first time, we have been able to culture corneal limbal stem cells without any animal protein or human amniotic membrane," informs Dr Samuel Abraham, Director, NCRM's branch in Chennai.