

## Effect of transfer of donor corneal tissue from McCarey–Kaufman medium to Optisol on corneal endothelium

The memory of keratoplasty patients waiting in town for months together in the days of my fellowship is still fresh in my mind. However, I am also fortunate to have witnessed a complete turnaround of the situation, wherein now I am able to schedule patients for cornea transplant surgery without fear of postponement from nonavailability of corneal tissues. In the past 25 years, we have witnessed a significant evolution of eye banking in India covering all different aspects that have impacted not only the number of transplantable corneas but also the way eye banking is practised in our country. Cornea retrieval technique has changed from the whole globe enucleation to *in situ* excision of corneoscleral rim; technique of cornea preservation has changed from being exclusively moist chamber to now predominantly using tissue storage medium MacCarey–Kaufmann; medical standards of eye banking are adopted by majority functioning eye banks and more and more eye banks are run by specifically trained personnel. All of these changes have resulted in a significant growth in availability of transplantable corneas with simultaneous improvement in reliability on quality. Slowly, increasing numbers of surgeons are able to schedule their cornea surgery cases with the result the practice of asking patients to wait in town is becoming increasingly uncommon.

All of these developments have been possible because of continuous efforts at multiple levels and include the creation of Eye Bank Association of India, development and implementation of medical standards by the National Program for Control of Blindness, policy changes by the governments and support and technical help from several nongovernmental and oversees eye banking organizations.

One of the other key factors in the evolution of eye banking has been the availability of McCarey–Kaufman (MK) tissue storage medium. In 1994, Ramayamma International Eye Bank (RIEB) with the help of International Federation of Eye and Tissue Bank Baltimore, USA, took the initiative of creating a facility for preparing the medium and making it available to eye banks in India and neighboring countries. Until 2015, RIEB distributed 281,181 vials of MK medium to different eye banks and corneal surgeons within India and 23,941 vials to eye banks in neighboring nations.

Use of the tissue storage medium allowed storage of tissues up to 72 h, which was a significant increase from 24 h with moist chamber preservation. This enhanced preservation helped tackling the problem of wastage of transplantable tissues that could not be used within 24 h of collection; allowed surgeons to schedule keratoplasty surgeries during regular working hours along with other planned surgeries and also facilitated transport of tissues to other towns or states.

All of these developments created a movement of growth in eye banking. At present, several eye banks are able to not only meet local demands but also are supplying corneas to

surgeons elsewhere in the state and even outside of state. RIEB in the year 2016 supplied 191 corneas within Telangana outside of Hyderabad and 1075 corneas out of the state of Telangana. Several other eye banks are reporting similar trends.

While the distribution of corneal tissues outside of the city of collection is a welcome move, it posed the challenge of additional time required for transporting tissues. Despite growing network direct connectivity by air is available for few metrocities. Many a time, eye banks are required to distribute tissues using ground transport system or using connecting flights.

Therefore, the demand for intermediate-term storage media such as Optisol GS and Eusol that allows storage of corneal tissues for 7–14 days is increasing. Certainly, the cost of preservation media is 8–10-folds higher than that of MK medium and most eye banks are unable to afford this cost for routine use or primary collection. Therefore, the eye banks started the practice of transferring corneal tissues stored in MK medium to one of the intermediate-term storage medium in case longer preservation becomes necessary. This practice is much different from how these intermediate-term media are used in developed nations where these are used for primary preservation. It is prudent to ask the question how safe is this practice and how long can a tissue be preserved once it has been in a short-term tissue storage medium. In 1984, Nelson *et al.* studied paired corneas to determine the effects on the endothelium of corneas stored in MK medium initially and then shifted to standard organ culture medium. The authors did not find any adverse effects both on specular microscopy and transmission electron microscopy.<sup>[1]</sup>

This issue carries a study by Kapoor *et al.* who made an attempt to answer this question in a prospective randomized clinical trial.<sup>[2]</sup> Twenty pairs of corneal tissues that otherwise met the criteria of being good quality were enrolled in the study. One tissue from each pair was collected in Optisol GS medium and the other tissue of the pair in MK medium. After 48–53 h, the tissues in the latter group were transferred to Optisol GS simulating the clinical practice. The tissues in both groups were evaluated using slit lamp and specular microscope. The outcome measure was the change in specular microscopy parameters on day 7 of storage from baseline. The investigators found that on day 7 specular microscopy parameters were inferior in the group B compared to the group where corneas were stored in Optisol GS from start. The authors concluded that although corneas in both group retained endothelial quality criteria of acceptability for surgery, the transfer of tissues from MK medium to Optisol GS was associated with much greater deterioration in corneal endothelial quality.

This study is important for many reasons although we are not required to change our practice based on its findings. First, the study provides us a useful evidence that none of the tissues handled in this manner lost quality to fall below standards of acceptability. Second, the data provide us an opportunity for formulating guidelines for using such tissues. These can be following: (1) we should not be using this practice for corneas with relatively low endothelial counts, (2) If tissues are stored for 7 days or longer reevaluation will provide surgeon reassurance of the quality, (3) Once tissue is transferred to

Optisol eye banks, or surgeons should not lose out on the efforts at expediting the use of the tissue, (4) In contrast to 10–14 days of storage time with Optisol GS, the tissues stored using hybrid procedure must be used within 7 days. Beyond this limit, endothelial quality might become inferior.

To conclude, I find the story of eye banking in India very interesting. It will serve as a useful model for many other nations who are beginning their journey and have limited resources.

### *Prashant Garg*

Tej Kohli Cornea Institute, L. V. Prasad Eye Institute, Hyderabad, Telangana, India

**Correspondence to:** Dr. Prashant Garg,  
Tej Kohli Cornea Institute,

L. V. Prasad Eye Institute, L. V. Prasad Marg, Banjara Hills,  
Hyderabad - 500 034, Telangana, India.

E-mail: prashant@lvpei.org

## References

1. Nelson JD, Lange DB, Lindstrom RL, Doughman DJ, Hatchell DL. McCarey-Kaufman (MK) organ culture and MK medium-shifted corneas. *Arch Ophthalmol* 1984;102:308-11.
2. Kapur N, Gunda S, Dixit S, Chauhan L, Acharya M, Mathur U. Effect of transfer of donor corneal tissue from McCarey-Kaufmann medium to Optisol-GS on corneal endothelium. *Indian J Ophthalmol* 2018;66:219-2.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

Access this article online	
<b>Quick Response Code:</b>	<b>Website:</b> www.ijo.in
	<b>DOI:</b> 10.4103/ijo.IJO_1135_17

**Cite this article as:** Garg P. Effect of transfer of donor corneal tissue from McCarey-Kaufman medium to Optisol on corneal endothelium. *Indian J Ophthalmol* 2018;66:223-4.