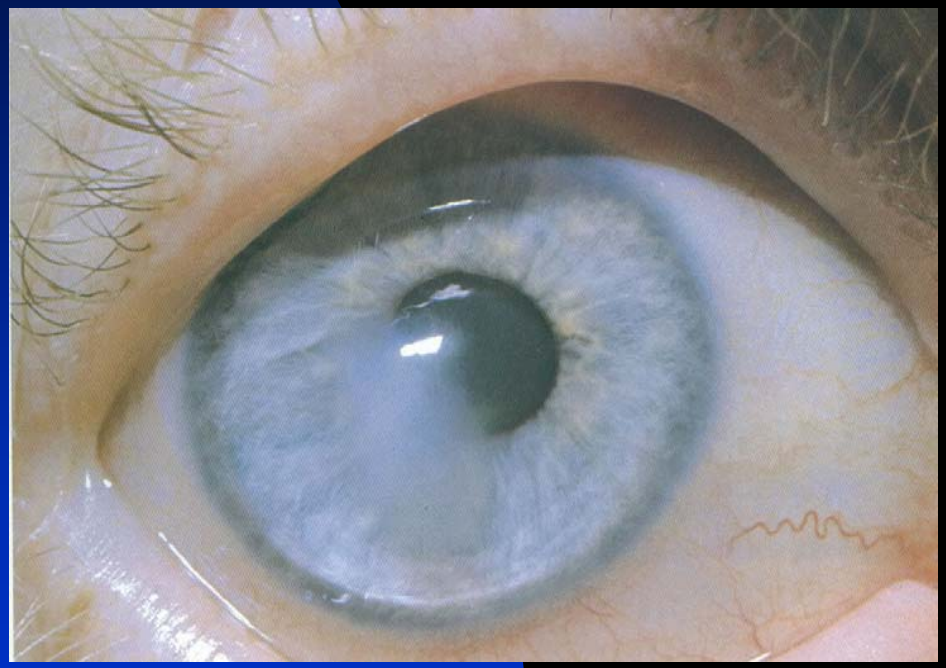
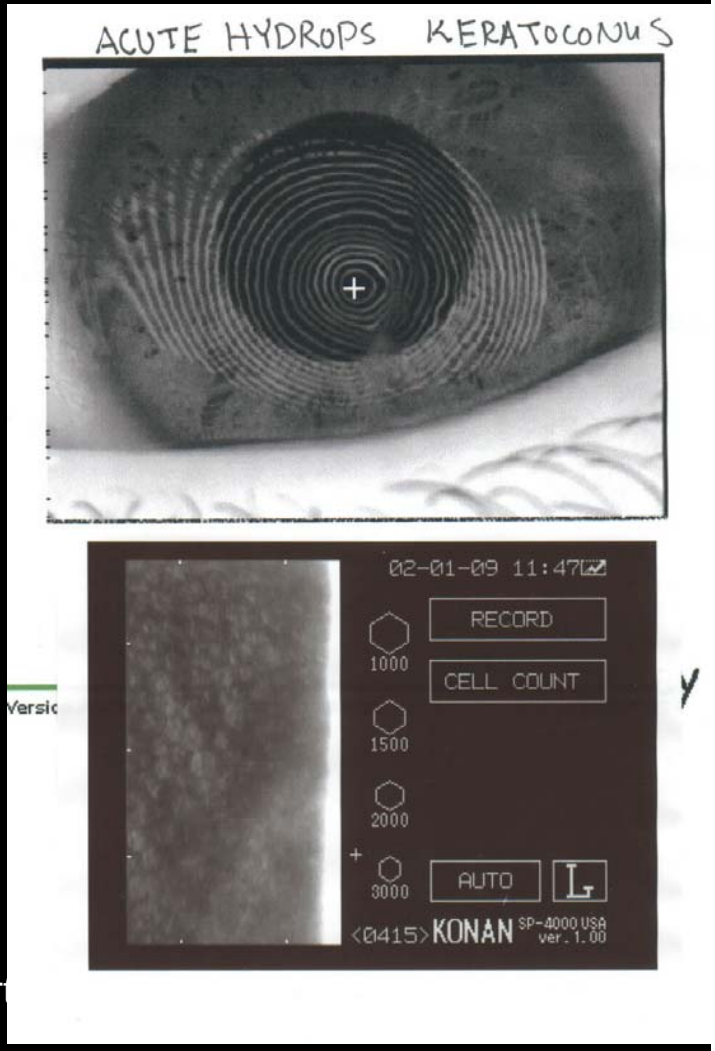
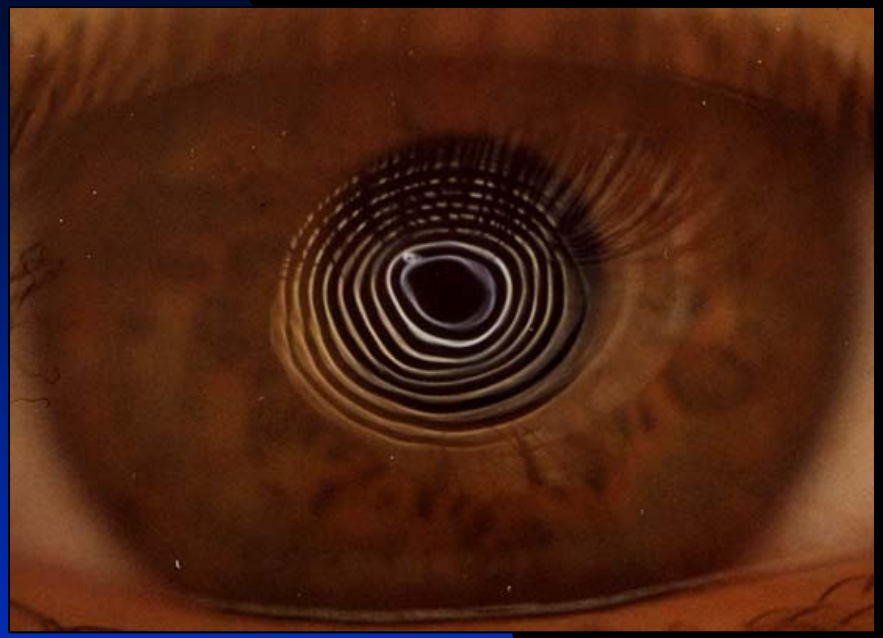
EYE RUBBING CAUSING HYDROPS





RE Pre-Hydrops



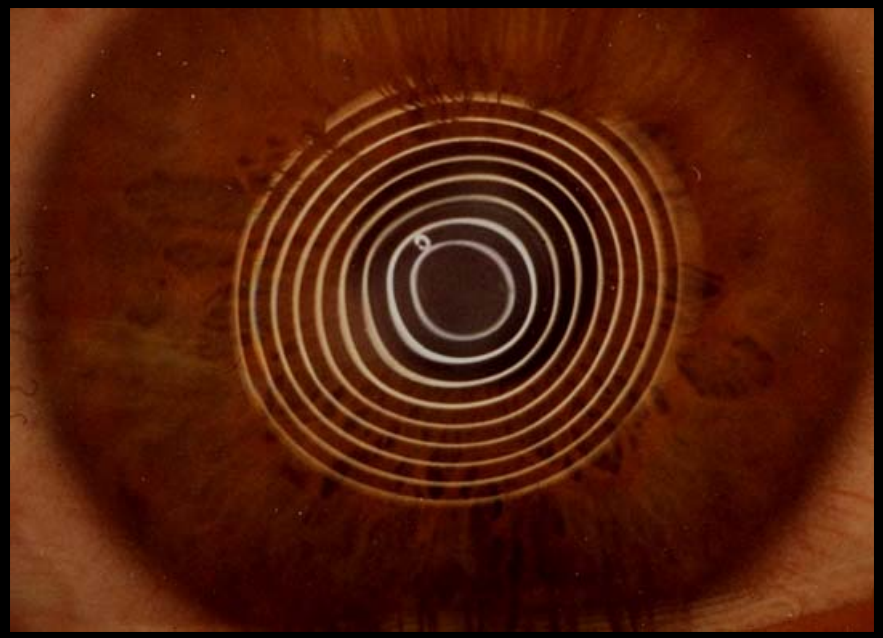
PREV

5.30mm (63.75 D.)

–20.75

8.7

RE Post-Hydrops



6.40mm (52.75 D.)

–16.50

8.7

Edmonds, Wung, Husz, Pemberton Study Design:

Corneal topography mapping and pachometry done to identify thinnest area. Endothelial cell evaluation done within the mapped thinnest area.

Both KC contact lens wearers and non-contact lens wearers were evaluated.

100 patients : 41 female, 59 males

Evaluated 197 KC eyes, ages 12 to 64.

Eye & Contact Lens 30(1): 54–58, 2004

Corneal Endothelial Cell Count in Keratoconus Patients After Contact Lens Wear

Charles R. Edmonds, O.D., F.A.A.O., Shu-Fen Wung, PH.D., R.N.,
Marla J. Husz, O.D., and Bart Pemberton, O.D., F.A.A.O.

Purpose. The influence of contact lenses on healthy corneal endothelium has been well documented, but little is known about the effect of contact lens wear on the corneal endothelial cells of patients with keratoconus. This cross-sectional comparative study was conducted to determine quantitative characteristics of corneal endothelial cells of 100 patients with keratoconus with or without contact lenses. **Methods.** A Humphrey Atlas corneal topographer was used to map the keratoconic cornea. The corneal apex of the cone was located by using the axial topography map. The Konan SP-9000 Noncon Robo Pachy specular microscope and the Konan SP-400 specular microscopes were used to photograph the endothelium at the apex of the cone, and the average endothelial cell count was obtained. Patients were categorized into four groups based on the types of contact lenses worn: no contact lenses, SofLens 66 toric contact lenses, SoftPerm contact lenses, and FluoroPerm 30 aspheric rigid gas-permeable (RGP) contact lenses. Analysis of variance was used to determine differences in endothelial cell counts among groups. **Results.** After controlling for age and severity of keratoconus, patients who wore SoftPerm contact lenses had 18% lower endothelial cell counts (2,157 ± 442) than did patients without contact lenses (2,538 ± 398). These patients also had 15% lower endothelial cell counts than did patients who wore soft toric disposable contact lenses (2,483 ± 292). There was a 7% lower endothelial cell count in the group wearing aspheric RGP contact lenses than in the group that did not wear contact lenses, and a 5% lower endothelial cell count in the group wearing aspheric RGP contact lenses than in the group that wore soft toric contact lenses, but these differences were not statistically significant. **Conclusions.** Patients with keratoconus who wear SoftPerm contact lenses have a significantly lower endothelial cell count than those patients with keratoconus who do not wear lenses, or who wear soft toric disposable contact lenses or RGP contact lenses.

Key Words: Contact lenses—Corneal endothelial cell count—Corneal topography—Keratoconus—Specular microscope.

The corneal specular microscope projects light onto the cornea and uses reflected light to show a magnified image of the endothelium. The endothelial cell layer pattern can now be photographed clinically to create a specular photomicrograph. Cell shape, size, pattern, and density can be evaluated noninvasively (Fig. 1).[1] Extensive research has concentrated on the anterior part of the keratoconic cornea, investigating the epithelium, Bowman's layer, and the stroma, with less emphasis on the endothelium and Descemet's membrane.[5,6]

Clinical specular microscopy shows that healthy endothelial cells are quasi-hexagonal, generally the same size, and have an average density of 2,400 to 2,700 cells/mm^2 at the age of 40 years. In most people, cell density decreases with age. Typically, cell density decreases rapidly from birth to adolescence, stays relatively stable from age 20 to 50, and decreases significantly again after age 60.[2]

Long-term wear of a contact lens with limited oxygen permeability seems to contribute to morphologic changes in endothelial cells.[2] Polymegethism (i.e., increased variability in cell size) and pleomorphism (i.e., increased variability in cell shape) have been observed with contact lens wear.[3,4] Because most patients with keratoconus wear contact lenses, it is important to differentiate endothelial changes caused by biochemical and biomolecular cascade mechanisms versus contact lens–induced hypoxia and mechanical stress.[5,6] However, little information is available relating endothelial cell changes to contact lens wear in patients with keratoconus. The purpose of our cross-sectional comparative study was to document corneal endothelial cell density in patients with keratoconus who wore no contact lenses or wore contact lenses (rigid or soft) of varying oxygen permeability.

MATERIALS AND METHODS

The diagnosis and severity of keratoconus in patients enrolled in the study were based on biomicroscopic evaluation and Humphrey's Pathfinder detection software. Biomicroscopy was used to determine the presence of corneal thinning, Vogt striae, Fleischer ring, and apical scarring. Patients with severe corneal scarring were not included in our review, because accurate cell counts could not be completed.

The Humphrey's Pathfinder Corneal Analysis criteria were analyzed, and the keratoconic corneas were graded by severity. The Pathfinder corneal analysis software consists of the following statistical indicators: corneal irregularity measurement (CIM), shape factor (SF), and mean toric keratometry (TKM). CIM is an index number assigned to represent the irregularity of the corneal surface in micrometers. Normal CIM values range from 0.03 to 0.68 μm, and the higher the number becomes, the more abnormal

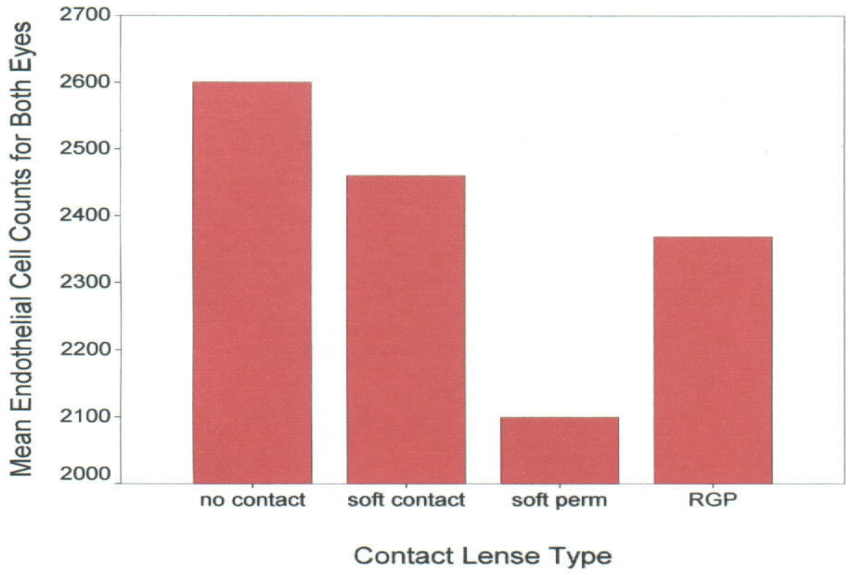
From Drs. Edmonds & Husz, O.D., P.C. (C.R.E., M.J.H.), Tucson, AZ; College of Optometry (B.P.), Pacific University, Forest Grove, OR; and College of Nursing (S.-F.W.), University of Arizona, Tucson, AZ.
Address correspondence and reprint requests to Dr. C.R. Edmonds, 4730 East Pima Street, Tucson, AZ 85712.
Accepted October 21, 2003.
DOI: 10.1097/01.ICL.0000105561.89689.C8

8/31/02 Oneway ANOVA for cell count comparisons in 4 groups

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Right eye's cell count	Between Groups	776067.97	3	258689.322	1.308	.281
	Within Groups	11272908	57	197770.323		
	Total	12048976	60			
Left eye's cell count	Between Groups	1659315.5	3	553105.154	2.693	.055
	Within Groups	11295875	55	205379.540		
	Total	12955190	58			
left eye + right eye	Between Groups	4934746.6	3	1644915.547	2.409	.077
	Within Groups	37561383	55	682934.237		
	Total	42496130	58			

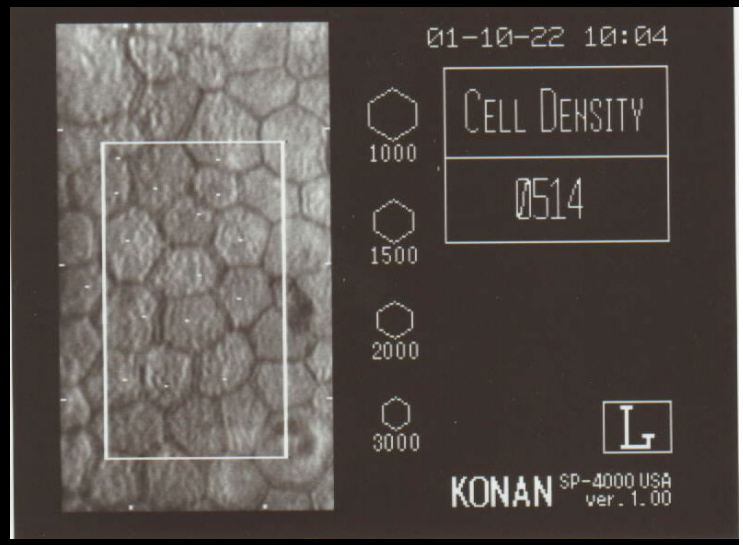
mean cell count for both eyes



Mean cell count for right eye

KC, Contacts and Endothelium

- Lower endothelial density not related to KC severity.
- Significant difference between lenses of varying Dk/t

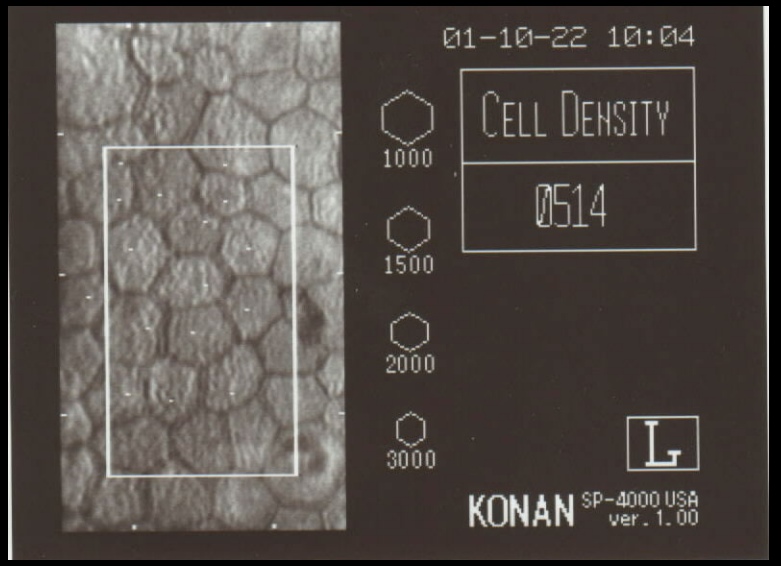


Edmonds CR, Wung SF, Husz MJ, Pemberton B, Corneal Endothelial Cell Count in Keratoconus Patients after Contact Lens Wear. Eye Contact Lens 2004 30(1):54-58

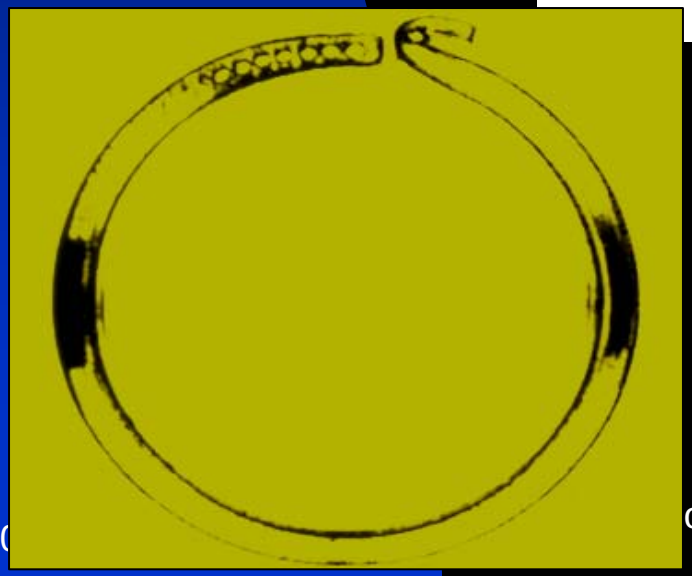
Corneal Surgery for KC

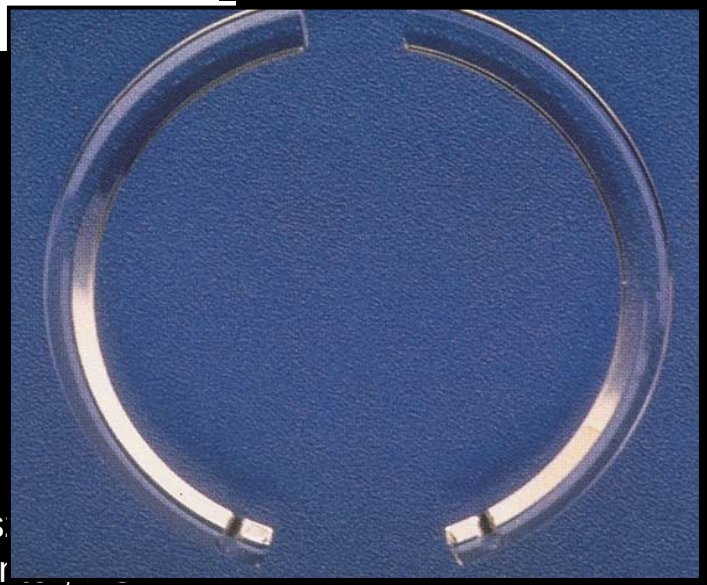
- Corneal Transplant
- Lamellar Keratoplasty
- Intacs/ with lamellar keratoplasty

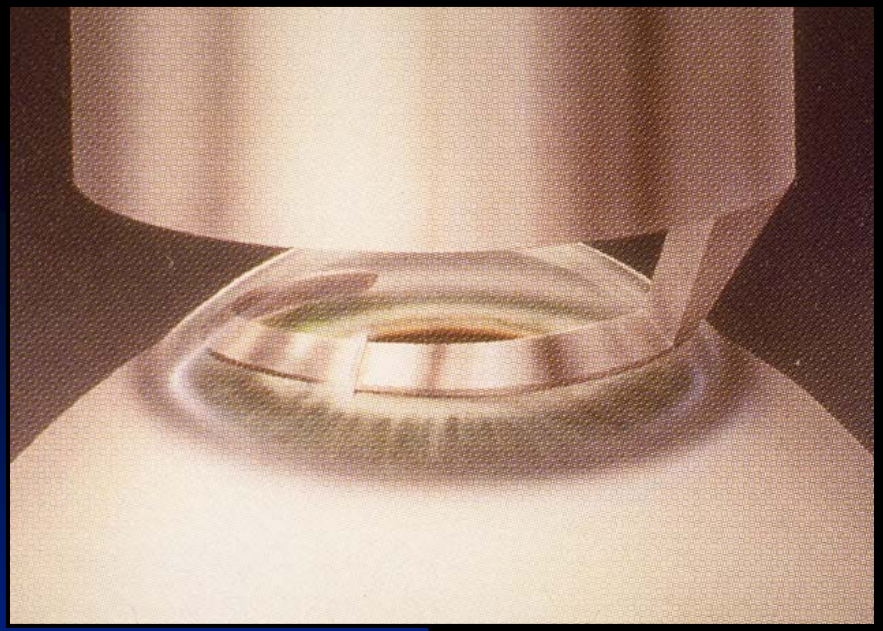
Corneal transplant reduced endothelial cell count

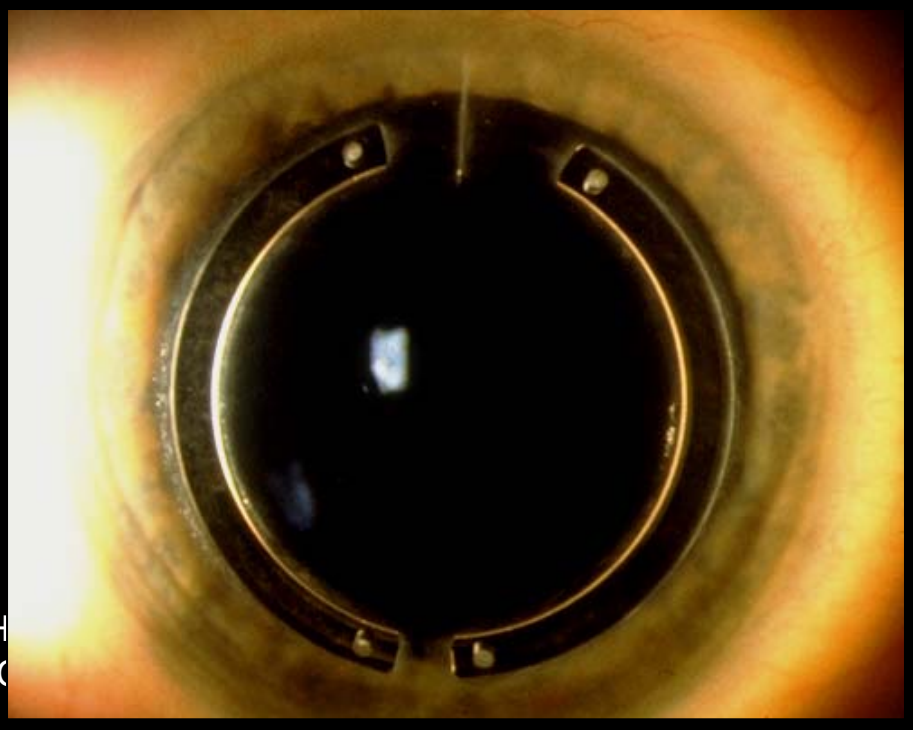


Intrastromal Ring / Intacs
Addition Technology



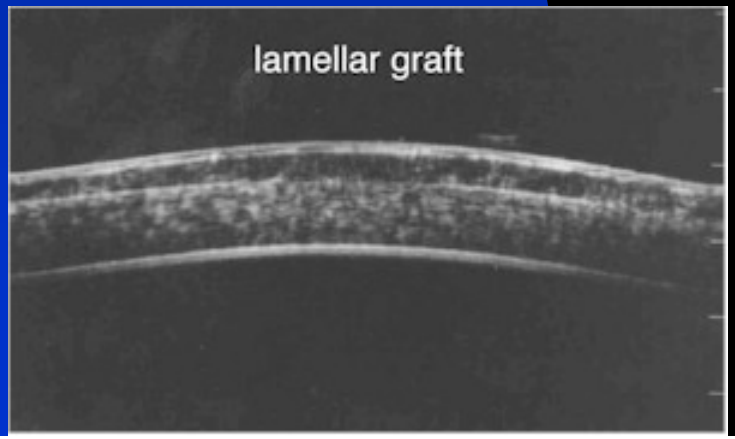






Lamellar Keratoplasty

- Replace diseased anterior corneal stroma and Bowman's with donor tissue.
- Technically more difficult than PKP
- Preserves host endothelium
- Minimal risk of rejection



Pre-op vs Post-op