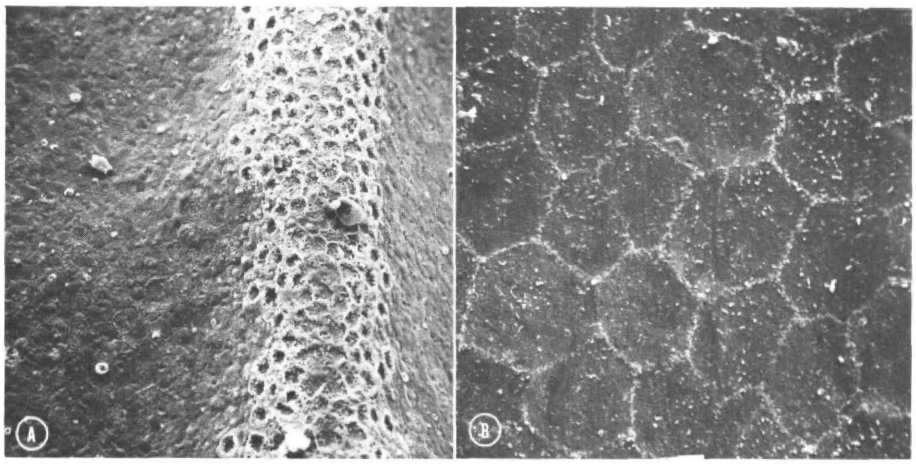

Fig. 2. *A*, Case. 5. Cell death was common, but not invariable on the crests of endothelial folds. (×125.) *B*, Case 7. Endothelium of control eye stored for 72 hours. (×500.)

younger corneae,[10] this argues strongly against the use of aged donors for penetrating keratoplasty.

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Key words: cornea, preservation, endothelium, viability, scanning electron microscopy, trypan blue, pachymeter, human, storage.

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A controlled comparison of two therapeutic soft lenses in a clinical model.

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Laboratory data of a new, highly hydrated contact lens (Weicon 72) indicated that it might be therapeutically superior to the known Weicon 38. The great variability of therapeutic contact lens cases, however, makes a sound clinical evaluation difficult. Therefore the two lenses were tested in a clinical model using patients with traumatic superficial corneal defects. The results were statistically significant, the Weicon 72 proving to be superior to the Weicon 38.

Although considerable progress has been made in the field of therapeutic soft lenses during the past few years,[1, 2] therapeutic failures and complications are not uncommon. These may be due

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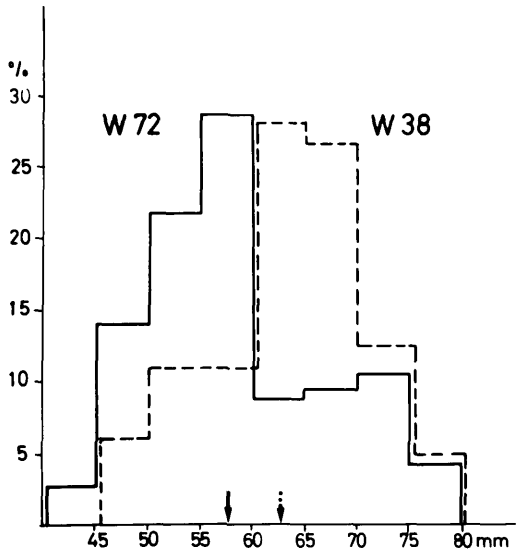

Fig. 1. Patients' (%) central corneal thickness (mm.) immediately after removal of the W38 and of the W72 lens. ↓ ↓ denote average values for the W72 and the W38 group (see Δ ab in Table I).

Table I. Central corneal thickness (mm., $\bar{x}$)

	W38	*W72*
Immediately after removal of the lens	0.63[a]	0.58[b]
24 hours after removal of the lens	0.53[c]	0.52[d]

Statistical analysis:
Δ ab: α = 0.05*
Δ ac: α = 0.001†
Δ bd: α = 0.01†
Δ cd: = not significant*

*By t test for independent values.
†By paired t test.

to erroneous diagnosis or indication, inadequate fitting techniques, missing or inadequate additional eye drop therapy, or to the design and the material of the soft lens itself. In a given clinical situation it is not always easy to evaluate the reason for a therapeutic failure or a complication, and the great variability of therapeutic contact lens cases makes this task even more difficult.

Since 1976 a new hydroxy-ethyl-methacrylate soft lens type of 72 percent water content (Weicon 72, W72) has become available for therapy. Its laboratory data indicated that it might be superior for therapeutic purposes to the 38 percent hydrated Weicon 38 (W38) which has an identical configuration and has now been in use for 6 years.

A major uncontrolled casuistic study indicated that the W72 might indeed have certain advantages, but failures and complications were also experienced.[3]

Therefore we proceeded to the investigation of a clinical model which was readily available and which was likely to uncover differences in toleration and therapeutic effectiveness of the lenses. From our casuistic experience we concluded that both lens types were more or less well tolerated in cases which were presumed to have either reduced or normal corneal metabolism. However, if the corneal metabolic turnover was increased, the soft lenses were often poorly tolerated and had to be removed. Patients with superficial corneal defects after foreign body removal are likely to exhibit a transient acceleration of corneal metabolism. These numerous patients make up a uniform clinical group. A therapeutic trial with soft lenses would seem to be justified in view of the encouraging results in soft lens treatment of recurrent erosions.

Materials and methods. Fifty patients with uncomplicated corneal foreign bodies agreed to take part in the study. After informed consent and removal of the foreign body with an electric drill, they were randomly given a W72 or W38 by K. B. or K. S., thus making two groups of 25 patients each. Additional therapy consisted of commercially available kanamycin eye drops (Kanamytrex) five times daily. Controls were examined by R. S. on 3 consecutive days and also 24 hours after removal of the lens. The patients were not seen by K. B. or K. S. again. R. S. was unaware of the lens type worn. Results were recorded in a grading system for lid, conjunctiva, corneal epithelium, epithelial defect, corneal stroma, anterior chamber, and fitting of the lens. After 3 days of continuous wear, the lens was removed. If a patient insisted on having the lens removed earlier or if complications arose, the lens was removed immediately. Slight to moderate corneal edema was not regarded as a threatening complication in this study. To obtain the average value, the central corneal thickness was measured five times immediately after lens removal and again 24 hours later with a Zeiss pachymeter.

Results. Regarding the fit of the lenses, most moved slightly with the lid, a few moved more freely, and in some cases the movement was restricted. Differences in fitting may well correlate with differences in corneal thickness, and it is therefore important to notice that the occurrence of ill-fitting lenses was equally distributed in both groups.

In the W38 group only six of the 25 patients could wear the lens continuously for 3 days. Nine patients had the lens removed after 2 days, and 10 more patients after only 1 day, mostly because of pain and objective intolerance indicated by a red eye and corneal edema. Also in this group occurred three cases of lid edema, one cases of trauma unrelated stromal infiltrate, two cases of slight iritis, and a peculiar case of large epithelial bullae, the etiology of which remained

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obscure because the endothelium looked normal when biomicroscopically observed.

In the W72 group, 21 out of 25 patients achieved 3 days continuous wear (chi-square: $p < 0.001$). The difference between the two groups is even greater when taking into account the reasons which led to premature removal of the W72. One lens was removed from a white eye after 2 days because the patient had to go on an unforeseen trip. In a second case, the margin of the W72 was broken, and the lens was removed because of slight local irritation, the cornea having healed completely without edema or intolerance. A third W72 had to be removed because a traumatic defect near the limbus showed signs of increasing infiltration. After a review of the records it was found that a slight infiltration had existed before soft lens fitting, and thus this patient should not have entered the study. The fourth patient who had his W72 lens removed before the third day demanded this because of pain without observable intolerance.

Although epithelial edema was most marked in the W38 group, it was not totally absent in the W72 group (data not shown). A statistical evaluation of corneal thickness measurements is given in Table I. Fig. 1 shows the variance of corneal thickness measurements immediately after lens removal in both groups.

All complications were effectively treated. Most of the swollen corneae had returned to normal within 1 day following removal of the lens. No permanent injury resulted from soft lens therapy.

Conclusions

1. The highly hydrophilic W72 proved to be superior to the less hydrated W38 in this random, controlled investigation of a clinical model for therapeutic soft lenses. The W72 was clearly better tolerated by the patients. Also corneal swelling after continuous wear was statistically less with the W72 than with the W38.

2. Every known therapeutic soft lens exhibits some barrier function on corneal metabolism, which may or may not be overcome by corneal adaptation. This also holds true, but to a significantly lesser degree, for the W72 in our test system. Tolerance toward the lenses often improved at the end of the wearing time when the corneal defects were healed and metabolism approximately normal again (data not shown).

3. For a rapid clinical investigation of contact lens materials, we suggest the application of a clinical model which allows a sufficient number of comparable patients to be tested under controlled conditions. In our system the investigation of patients with superficial traumatic defects discriminated sharply between the two differently hydrated soft lenses and confirmed the superiority of the W72 lens. We believe that further use of the W72 lens is justified for therapeutic purposes in preference to the W38 lens. Therefore the W72 lens may serve as a reference lens in further comparative studies of the kind reported here.

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Key words: clinical model, controlled comparison, corneal defects, therapeutic soft lenses.

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Extraocular muscle fibers: ultrastructural identification of iontophoretically labeled fibers contracting in response to succinylcholine.

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Cat extraocular muscle fibers (from the superior rectus or inferior oblique) were penetrated in vivo with Procion red–filled glass microelectrodes. When stable penetrations were obtained, succinylcholine (Sch), 8 to 20 μg, was injected into the femoral vein. In some fibers, a depolarization-repolarization response was obtained with the same time course (2 min.) as the total muscle contraction. The depolarizing fibers were labeled iontophoretically. The ultrastructural characteristics of five depolarizing fibers and three control (nondepolarizing) fibers were then studied. The fibers that did not depolarize to Sch had the characteristics of singly innervated cells, whereas those sensitive to Sch had morphological characteristics of multi-innervated fibers.

Extraocular muscles (EOM's) contract when exposed to neuromuscular depolarizing drugs such

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