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Correspondence

Long-term Complications of the MAl Hydrogel Intrascleral Buckling Implant

To the Editor.-We at MIRA Inc, Waltham, Mass, have had the opportunity to support the investigation of MAl hydrogel implants described in this issue of the ARCHIVES.[1] We performed the micro-Fourier transform infrared spectroscopic analysis that compared the clinical specimen from case 3 with production lots of hydrogel implants of different ages.

See also p 86.

The spectroscopic analysis revealed that the clinical specimen had a polymeric structure significantly different from that of the production lots, but this does not imply that the clinical specimen degraded in vivo. The clinical specimen was synthesized from a laboratory batch process that predated the production lots. These laboratory batches were experimental and !mown to contain variable levels of components that would account for the differences described by the spectra. Polymers most resistant to degradation are prepared with careful control for extent of polymerization, level of impurities, and ratio of components. Furthermore, a hydrogel sample from the same laboratory batch was not available to serve as a control in the analysis. The original structure of the clinical specimen could not be confirmed.

To date, there have been no patients with MIRAgel implants who have developed the complications described in the report by Marin et al. MIRAgel continues to be manufactured according to good manufacturing practice guidelines for strict formulation and processing controls.

MIRA Inc concurs with the authors for lifetime annual follow-up of scleral buckling procedures regardless of tbe buckle material used.

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Mr Hasslinger is the director of Research and Development at MIRA Inc, Waltham, Mass.

1. Marin JF, Thlentino Fl, Refojo MF, Schepens CL. Long-term complications of the MAl hydrogel intrascleral buckling implant. *Arch Ophthalmol.* 1992;86-88.

In Reply.-We concur with Mr Hasslinger that because we were unable to obtain unused MAl polymer implants of the same vintage as the polymer implants retrieved from the patients, we cannot be sure that the hydrolysis observed in the retrieved implants was not a phenomenon characteristic of these early MAl samples. The polymer implants retrieved from the patients were made before MIRA Inc obtained the license from the Eye Research Institute to make MIRAgel. However, MAl polymer, made by the same procedure as the retrieved implants, and the currently available MIRAgel implants have the same chemical composition, as is demonstrated by the identical micro-Fourier transform infrared spectra.

In fact, there are no data available to us to support Mr Hasslinger's remark that the early MAl "laboratory batches were experimental and !mown to contain variable levels of components that would account for the differences described by the spectra." Sterile MAl implants stored in saline solution in the laboratory for several years maintained their original hydration and chemical structure. The changes were only observed in retrieved intrasc1eral MAl implants.

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Corneal Welding Using Hydrogen Fluoride Lasers

To the Edito1:-Welding, or fusion, of tissues using laser energy was first described by Jain and Gorisch.[1,2] The process involves some heat rise and apparently involves dissociation and reassociation of collagen fibrils without causing complete protein denaturation. Attempts to weld corneal or other ocular tissues have not met with success to date.[3,4]

We report the fusion of corneal stroma in porcine cadaver eyes using two special wavelengths of the laser. The fusion occurred without the use of adhesional or accessory proteins and exhibited mechanical strength dependent on the depth of the fusion. Scleral tissue was also welded, although without the high degree of strength demonstrated by a corneal weld. To our !mowledge, this is the first report of welding in corneal or scleral tissue in which significant mechanical strength was exhibited.

Porcine eyes were obtained within 6 hours of slaughter. Epithelium was debrided by scraping it with a Bard-Parker surgical blade. A full-thic!mess incision was made in a 7-mm arc directly across the central cornea for experimental purposes.

Helios continuous-wave hydrogen fluoride (HF) chemical lasers were used to produce the welds. One wavelength was the HF fundamental10P2 vibrational rotational transition at 2.5788 μm and 30 mW. The other wavelength was the HF overtone 20P6 vibrational rotational transition at 1.3404 μm and 320 mW.[5] The welding spot size was 0.2 mm in diameter, and was moved at a rate of 1 mm per minute across the incision. The entire incision was closed in 7 minutes, forming a leakproof seal. The HF fundamental laser produced a weld that was visible as a thin line of approximately 100 μm in depth from the surface of the cornea, while the HF overtone laser produced a weld that was much deeper, approximately 300 μm.

The welded globes were slowly filled and pressurized with