using high-dose limbal antigen in the LB II group (30 mg/week), when compared to retino-uveal antigen, although suggestive, was not statistically significant (Table I). On the other hand, the number of eyes with 1+ cells in the trabecular region with high-dose limbal antigen, as opposed to retino-uveal antigen, was statistically significant (0.05 > p > 0.02) (Table I). Using the Mann-Whitney U Test, it was found that the increased number of mononuclear cells with either dose of limbal antigen was significant when compared to retino-uveal antigen (0.02 > p > 0.05 for uvea vs. LB I and 0.002 > p > 0.01 for uvea vs. LB II) (Table II). The difference in number of cells between the two doses of limbal antigen was not, however, statistically significant.

**Discussion.** This study showed that limbal tissue, antigen, which included the trabecular meshwork, induced a mononuclear infiltrate of the ciliary body similar to the one invoked by uveal antigen. In addition to the response of the uvea, there was also a significant increase in the number of mononuclear cells in the trabeculum. Others have mentioned the presence of cells in the trabecular meshwork and episcleral tissue as part of a generalized inflammation induced by retino-uveal antigen. This study showed that limbal tissue was superior in producing more inflammation in trabeculum as compared to uveal tissue. Whether it was the trabecular or scleral component of the limbal antigen that elicited the inflammatory response in the trabeculum was not determined in this experiment, since the trabecular meshwork could not be dissected out for use as a separate antigen.

The results of this study imply that there is an antigen which induces lymphocytes and plasma cell migration into the trabecular and episcleral regions. Inflammatory cells could cause obstruction at either the trabecular or episcleral levels or perhaps both and cause increased intraocular pressure.

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**Key words:** limbus, trabecular meshwork, episclera, antigen, aqueous obstruction, lymphocytes, plasma cells

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**Elastin content of the scleral spur, trabecular mesh, and sclera. ROBERT A. MOSES, WALTER J. GRODZKI, JR., BARRY C. STARCHER, and MICHAEL J. GALIONE.**

The scleral spur and trabecular mesh of the human eye contain approximately 3% elastic tissue. Elastic tissue forms less than 2% of the sclera.
The scleral spur consists of an inward-projecting group of limbus-parallel fibers that form the inner surface of the sclera at the junction of the scleral and corneal curvatures. The spur and the scleral roll form the posterior wall of the internal scleral sulcus. The placement of the spur-roll suggests that it is concerned with maintaining the opening of the canal of Schlemm. Recently, it was shown that the scleral spur-ring has considerable strength. Salzmann and Iwamoto suggested that the spur contained elastic fibers. Others have considered the spur to be composed of collagen. The present study quantitates the levels of elastin and collagen present in the scleral spur.

Methods. Scleral spurs were dissected from 12 human eyes obtained at autopsy as described previously. Trabecular mesh was scraped from the spur and from the scleral furrow. Pieces of anterior sclera were also excised. Each tissue type was then divided into two pools representing six eyes each. The spurs and sclera samples were minced, and all samples were extracted in neutral saline for 48 hr to remove small amounts of blood and soluble proteins and then freeze-dried. The average freeze-dried weight of a single spur was 675 μg. The samples were hydrolyzed in 6 N HCl for 72 hr at 105°C. Five percent of the hydrolysate was analyzed for hydroxyproline by amino acid analysis on a Beckman 116 analyzer. The remainder of the hydrolysate was analyzed for desmosine and isodesmosine as described previously. Collagen was estimated from hydroxyproline assuming collagen is 13% hydroxyproline. Elastin was estimated from the desmosines assuming that human elastin contains 1.8% desmosine and isodesmosine by weight.

Results and discussion. Hydroxyproline analysis indicated that the human scleral spur is primarily composed of collagenous protein. Based on freeze-dried weight, 75%-80% of the spur is collagen. Elastin content, estimated by desmosine analysis, indicated that the human scleral spur contains about 5% elastin (Table I). Analysis of the trabecular mesh and sclera samples also showed the presence of elastin in these tissues.

Desmosine and isodesmosine are cross-linking amino acids unique to the protein elastin. Since they are found only in elastin and appear to be remarkably constant in all elastics within a species, these amino acids can be used to quantitate elastin content. These results confirm the histologic evidence showing that the scleral spur is composed primarily of collagen with interspersed elastin fibers. The relatively high connective tissue composition of the spur accounts for the high Young's modulus of elasticity and provides the structural strength to maintain configuration of the posterior portion of Schlemm's canal.

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Key words: eye, chemistry, scleral spur, elastic tissue

| Table I. Elastin content (%) of human scleral spur, trabecular mesh, and sclera* |
|---------------------------------|-----------------|-----------------|
|       | Group 1 | Group 2 |
| Spur  | 5.5     | 5.2     |
| Mesh  | 4.9     | 5.1     |
| Sclera| 1.5     | 1.2     |

*Calculated from desmosine and isodesmosine content of the saline-extracted freeze-dried samples; each value represents data from a pool of six specimens.

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