neal section on station 102 at the Diamond Light Source. The data were analyzed to form vector plots—the radial extent of which, in any direction, is proportional to the number of fibrils preferentially aligned in that direction. These were assembled, and the larger plots scaled down, to show the predominant orientation of collagen throughout each tissue section.

**Results.** Abnormalities in collagen organization were seen in both the anterior and posterior stroma of the keratoconus cornea (Figure 2), with the most drastic disruption occurring within the region of greatest corneal steepening (Figure 1). In the posterior stroma, the normal orthogonal predominant orientation of collagen was absent; in the anterior stroma, the usual isotropic arrangement of collagen was replaced with more highly aligned unidirectional collagen.

**Comment.** The results indicate that a gross rearrangement of lamellae had occurred in both the anterior and posterior regions of the keratoconus corneal stroma (Figure 2). These findings support our belief that the specific arrangement of stromal collagen plays a significant role in the maintenance of normal corneal curvature.

**Author Affiliations:** Structural Biophysics Group, School of Optometry and Vision Sciences, Cardiff University, Cardiff (Dr Hayes, Boote, and Kamma-Lorger, Ms Dooley, and Prof Meek), and Department of Ophthalmology, Royal Glamorgan Hospital, Llantrisant (Dr Hawksworth), Wales; Centre for Sight, West Sussex (Drs Khan and Daya), and Diamond Light Source, Harwell Science and Innovation Campus, Oxfordshire (Dr Sorensen), England; and Department of Ophthalmology, Havener Eye Institute, Ohio State University, Columbus (Dr Lewis).

**Correspondence:** Prof Meek, School of Optometry and Vision Sciences, Cardiff University, Maindy Road, Cardiff CF24 4LU, Wales (meekkm@cf.ac.uk).

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**Dacryops of Krause Gland in the Inferior Fornix in a Child**

Dacryops of the accessory lacrimal glands are extremely rare, with only 4 previous cases reported to involve Krause glands in the last 60 years. Dacryops of Krause glands have not been reported in the inferior fornix. The cause is often unclear, although numerous causes of secondary dacryops are known.

**Report of a Case.** An otherwise healthy 2-year-old girl had a left lower eyelid mass, noted since age 2 months.

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**Figure 1.** Findings in a 2-year-old girl. A, Left lower eyelid swelling (asterisk). B, Computed tomographic scan shows the cystic nature of the lesion (C) extending inferiorly, with enophthalmos of the left globe (G).
but enlarging during the previous 6 months. Her ocular and medical histories were unremarkable. Examination revealed a soft, fluctuant mass involving the left lower eyelid (Figure 1A). Computed tomography showed a cystic mass within the left lower eyelid, causing enophthalmos of the left globe (Figure 1B). Surgical dissection revealed a mass within the left inferior fornix, not involving the inferior tarsus. The lesion was excised intact. Histopathologic examination revealed a cystic structure lined mostly by a double layer of cuboidal epithelium, with focal apical microvillus processes (Figure 2A). The underlying stroma locally contained small islands of normal-appearing lacrimal gland with mild chronic nongranulomatous inflammation (Figure 2B). The diagnosis was dacryops of an accessory lacrimal gland of Krause of the inferior fornix based on its location and the histopathologic findings.

Comment. The term dacryops was proposed by Schmidt in 1803 and refers to lacrimal ductal cysts of the primary or accessory lacrimal glands.4 Dacryops of the accessory lacrimal glands have been reported only rarely.1,4 The apical microvillus processes5,6 of these lesions and the nearby presence of glandular acini1,6 are consistent with this diagnosis. Although histologically indistinguishable, Krause glands are anatomically located within the superior and inferior fornices, while Wolfring glands are found adherent or adjacent to the upper and lower tarsal plates.5,6 Wolfring gland dacryops have been reported more frequently than Krause gland dacryops.5,6 Weatherhead noted this disparity in 13 cases of Wolfring gland dacryops diagnosed during a 7-year period but only 1 case of Krause gland dacryops identified in the same period. All previously reported cases of Krause gland dacryops have occurred in the upper eyelids, where Krause glands are more abundant.1,4

Although originally considered secondary to ductal outlet obstruction, the pathophysiology of dacryops recently has been proposed as a complex process involving periductal inflammation and subsequent passive dilatation through a combination of hypersecretion, ductule wall weakening, and impaired neuromuscular contractility.1,2,5 However, the chronic nongranulomatous inflammation, as observed in our case, also may occur secondary to the dacryops. High concentrations of IgA also have been identified in the cystic fluid, and it is postulated that ductal inflammation leads to increased IgA secretion with the resulting osmotic gradient contributing to cyst formation.9 Numerous secondary causes of dacryops have been described, including trachoma, pemphigoid, trauma, and periocular surgery, while infrequently, as in our case, the etiology remains unknown.1,9 Secondary cases are seen mostly in older children and young adults; idiopathic cases, as in our case, are rarely reported but are thought to occur secondary to a congenital anomaly of the duct or an intrinsic abnormality in the secreted products, possibly related to chronic inflammation.1,6 The treatment of dacryops, whether originating from the primary or accessory lacrimal glands, is complete excision of the cyst, ideally intact. Incomplete excision and intraoperative cyst rupture are associated with increased rates of recurrence and fistula formation.4,6

In summary, we report dacryops of an inferior fornix accessory lacrimal gland of Krause. To our knowledge, this is the first reported case of Krause gland dacryops involving the lower eyelid. It remains imperative that all suspicious lesions are examined histopathologically and that the ophthalmologist considers the possibility of a lacrimal ductal cyst, even within the inferior fornix.

Andre’ Jastrzebski, MD
Seymour Brownstein, MD
David R. Jordan, MD
Joseph de Nanassy, MD

Author Affiliations: Departments of Pathology (Drs Jastrzebski and Brownstein) and Ophthalmology (Drs Jastrzebski, Brownstein, and Jordan), The Ottawa Hospital and University of Ottawa, and Department of Pathology, Children’s Hospital of Eastern Ontario and University of Ottawa (Dr de Nanassy), Ottawa, Ontario, Canada. Correspondence: Dr Brownstein, Department of Ophthalmology, University of Ottawa Eye Institute, 501 Smyth

Figure 2. Histopathologic findings (hematoxylin-eosin, original magnification ×400). A, Cystic cavity (asterisk) lined by a double layer of cuboidal epithelium with focal apical microvillus processes (arrows). B, Small islands of lacrimal gland tissue (arrows) and mild chronic nongranulomatous inflammation within the loose fibrous stroma adjacent to the cyst.
Use of Micronutrient Supplement for Preventing Advanced Age-Related Macular Degeneration in Japan

In accordance with the results of the Age-Related Eye Disease Study (AREDS), a randomized controlled trial performed in the United States, patients with age-related macular degeneration (AMD) in the United States have been instructed to take micronutrient supplements when their lesion fits the inclusion criteria. We conducted a survey about the patients' supplement use and the ophthalmologists' attitudes toward supplements in Japan, where the use is not based on ophthalmologists' prescription.

Methods. The questionnaire was given to patients diagnosed as having AMD at the Medical Retina Division, Department of Ophthalmology, Keio University Hospital, Tokyo, Japan, between January 8, 2010, and June 25, 2010. Another questionnaire was given to the ophthalmologists in our department. Supplements containing more than 50% of the AREDS-recommended levels of vitamin C, vitamin E, and zinc were designated AREDS-like supplements, and those that contained reduced amounts of beta carotene and included lutein were designated AREDS plus lutein supplements. This study was approved by the ethics committee of the Keio University School of Medicine.

Results. Patient Survey. Of the 163 patients with AMD who completed our questionnaire, 159 gave valid answers (119 male, 40 female; all ethnic Japanese; age range, 50-95 years; mean age, 73.9 years). Oral supplements of any type were used by 90 participants (56.6%); 23 used an AREDS-like supplement and 35 used an AREDS plus lutein supplement. Among the 139 candidates eligible for an AREDS supplement judged by the modified AREDS classification system based on fundus findings (Table), 48 (34.5%) used an AREDS-related supplement under their ophthalmologists' instruction; 17 used an AREDS-like supplement and 31 used an AREDS plus lutein supplement. Ninety-one participants (65.5%) had not used a supplement (Table), of whom 61 (43.9%) had not been given any instruction.

Doctor Survey. All of the 6 retinal specialists and 11 of the 12 non–retinal-specialized ophthalmologists considered AREDS-like supplements effective. All of the retinal specialists and 10 non–retinal-specialized ophthalmologists instructed their patients based on AREDS. However, 5 retinal specialists and 3 of the others included some additional information.

Comment. Overall, 56.6% of the participants in this study were taking supplements, which is lower than the proportion reported in the United States (93%). Surprisingly, all of the candidates who used the supplements were instructed to do so by ophthalmologists, suggesting that the patients' main source of information about supplements was their ophthalmologists.

Table. Age-Related Eye Disease Study–Related Supplement Use by 159 Participants According to Age-Related Macular Degeneration Category

<table>
<thead>
<tr>
<th>AMD Category</th>
<th>Total, No.</th>
<th>Using No. (%)</th>
<th>Not Using No. (%)</th>
<th>Candidate for AREDS No. (%)</th>
<th>Using No. (%)</th>
<th>Not Using No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1, no AMD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Group 2, early AMD</td>
<td>13</td>
<td>4 (30.8)</td>
<td>9 (69.2)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Group 3, intermediate AMD</td>
<td>14</td>
<td>NA</td>
<td>NA</td>
<td>3 (21.4)</td>
<td>11 (78.6)</td>
<td></td>
</tr>
<tr>
<td>Group 4, unilateral AMD</td>
<td>101</td>
<td>NA</td>
<td>NA</td>
<td>36 (35.6)</td>
<td>65 (64.4)</td>
<td></td>
</tr>
<tr>
<td>Unilateral CNV</td>
<td>1</td>
<td>NA</td>
<td>NA</td>
<td>1 (100.0)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>10</td>
<td>10</td>
<td>48</td>
<td>91</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: AMD, age-related macular degeneration; AREDS, Age-Related Eye Disease Study; CNV, choroidal neovascularization; GA, geographic atrophy; NA, not applicable; VA, visual acuity.

The patients were categorized into 5 groups according to a modified AREDS classification system (with group 5 added) based on fundus findings. Patients classified into group 3, group 4, and a subgroup of group 5 who had visual acuity of 20/100 or better in 1 eye with neovascular AMD were candidates for an AREDS-like supplement.