macular edema, thought to be immune recovery uveitis in the absence of CMV retinitis. She was treated with topical steroid eyedrops twice daily, an increased prednisone dosage to 60 mg/d, and an increased leflunomide dosage to 60 mg/d.

In April 2007, she developed an acute decrease in visual acuity of the right eye without floaters or pain. Her visual acuity without correction was 20/200 OD. Optical coherence tomography demonstrated an increase in macular edema on the right. The leflunomide dosage was increased to 80 mg/d and eventually to 100 mg/d without improvement in macular edema, so the leflunomide dosage was decreased back to 60 mg/d.

In April 2010, she developed an acute decrease in visual acuity of the right eye from 20/200 to 20/400 due to an inferiorty dislocated intraocular lens. She underwent intraocular lens surgery and had stable vision as of April 2011 and no CMV reactivation or recurrent inflammation.

Discussion | Multidrug-resistant CMV infection is a significant cause of morbidity and mortality among transplant recipients. Leflunomide has demonstrated activity against CMV1,2 and is also an immunosuppressive agent that may prevent solid-organ rejection.7 Leflunomide inhibits viral nucleocapsid and tegument development, suggesting that it is unlikely to share cross-resistance with DNA polymerase antivirals.2 Adverse reactions to leflunomide include hepatotoxic effects and immunosuppression.4 Our patient has tolerated this drug well with no reactivation of CMV retinitis for a 7-year period.

The Table provides details of her clinical course.

Leflunomide monitoring is essential owing to significant variation in the terminal half-life of the active metabolite (A77 1726).4 Recommended serum levels range from 25 ng/mL to 80 μg/mL.1,3 We were able to demonstrate vitreous leflunomide levels correlating with suppression of CMV retinitis.

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Conflict of Interest Disclosures: None reported.


Sclerochoroidal Calcification Is Primarily a Scleral Condition Based on Enhanced Depth Imaging Optical Coherence Tomography

Sclerochoroidal calcification (SC) is found in elderly white individuals with calcium pyrophosphate deposition in the sclera and/or choroid, appearing as a typical yellow subretinal mass usually along the retinal vascular arcades.1-4 Most cases are idiopathic, but some have a systemic relationship.1,3 We review multimodal imaging findings of SC.

Methods | Clinical and imaging data of 17 SC lesions in 13 eyes of 9 patients diagnosed at the Ocular Oncology Service, Wills Eye Institute, Philadelphia, Pennsylvania, were analyzed retrospectively. Institutional review board approval was obtained, and all patients provided written informed consent.

All patients underwent ocular examination, fundus photography, B-scan ultrasonography, fundus autofluorescence imaging using the Topcon TRC-50DX Retinal Camera (Topcon America; excitation light bandwidth, 580 nm; barrier filter bandwidth, 695 nm), infrared reflectance imaging, and enhanced depth imaging optical coherence tomography (EDI-OCT) using the Heidelberg Spectralis HRA + OCT (Heidelberg Engineering Inc). Analysis of the imaging was performed by 2 independent observers (A.T.F. and J.D.A.), with consensus used to resolve disagreements.

Results | There were 17 SC lesions in 13 eyes of 9 patients (5 male), 5 of whom had unilateral SC. All patients were white, and the mean age was 74 years (median, 73 years; range, 60-88 years). The referring diagnoses were SC (n = 3), choroidal tumor (n = 3), choroidal nevus (n = 1), choroidal melanoma (n = 1), and choroidal metastasis (n = 1). The mean best-corrected visual acuity was 20/33 (median, 20/25; range, 20/20-20/150).

All lesions were postequatorial and most were superotemporal (n = 12). The shapes of the lesions were geographic (n = 9), circular (n = 4), ill-defined (n = 3), and annular (n = 1). All lesions were orange to yellow. The mean greatest basal diameter was 3.5 mm (range, 1.0-7.0 mm), and the mean thickness on B-scan ultrasonography was 1.6 mm (range, 1.0-3.5 mm). All lesions were acoustically solid with shadowing suggestive of calcification. Orbital computed tomography performed on
1 patient demonstrated bilateral radiodense scleral lesions, confirming calcification.

On fundus autofluorescence imaging, 16 lesions were homogeneously hyperautofluorescent and 1 was homogeneously hypoautofluorescent with a hyperautofluorescent halo. Thirteen of 17 SC lesions had adequate infrared reflectance imaging and EDI-OCT. Of these, the lesions were hyperreflective (n = 11) or hyporeflective (n = 2) on infrared reflectance imaging. On EDI-OCT, all lesions originated within the sclera with thinning or absence of the overlying choroid (mean thickness, 28 μm; range, 0-119 μm) (Table 1 and Table 2). The lesions were elevated with undulating contour (n = 11) or flat (n = 2). The anterior scleral surface was irregular and “rocky” (n = 5) (Figure) or smooth and “rolling” (n = 8). The lesions were moderately reflective (n = 10) with bright anterior band (n = 3). The posterior margin of the lesion, and therefore the thickness, could not be identified in any case. By EDI-OCT, the mean diameter was 3689 μm (range, 2345-5804 μm). Overlying features included outer nuclear layer thinning (n = 2), external limiting membrane disruption (n = 1), inner segment–outer segment junction absence (n = 2), subretinal fluid (n = 1), retinal pigment epithelium alteration (n = 4), and pigment epithelial detachment (n = 1).

Discussion | The clinical and ultrasonographic findings of SC lesions are consistent with previous reports. Nearly all lesions were homogeneously hyperautofluorescent. Fundus hyperautofluorescence is typically related to increased lipofuscin in diseased retinal pigment epithelium. However, in most of our cases, the retinal pigment epithelium appeared normal clinically, with normal thickness on EDI-OCT. Therefore, we propose that thin-

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**Table 1. Lesion Findings of Sclerochoroidal Calcification on Enhanced Depth Imaging Optical Coherence Tomography in 9 Patients With 13 Lesions**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>In Fundus</th>
<th>Location</th>
<th>Contour</th>
<th>Anterior Scleral Surface</th>
<th>Reflectivity</th>
<th>Anterior Reflective Band</th>
<th>Thickness, μm</th>
<th>Diameter, μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OD ST</td>
<td>Sclera</td>
<td>Flat</td>
<td>Rocky</td>
<td>High</td>
<td>No</td>
<td>CD</td>
<td>CD</td>
</tr>
<tr>
<td>2</td>
<td>OD SN</td>
<td>Sclera</td>
<td>Flat</td>
<td>Rocky</td>
<td>Moderate</td>
<td>No</td>
<td>CD</td>
<td>2316</td>
</tr>
<tr>
<td>3</td>
<td>OD ST</td>
<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
<td>Moderate</td>
<td>No</td>
<td>CD</td>
<td>5034</td>
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<tr>
<td>4</td>
<td>OD ST</td>
<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
<td>Moderate</td>
<td>No</td>
<td>CD</td>
<td>5804</td>
</tr>
<tr>
<td>5</td>
<td>OD ST</td>
<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
<td>Moderate</td>
<td>No</td>
<td>CD</td>
<td>4265</td>
</tr>
<tr>
<td>6</td>
<td>OD IT</td>
<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
<td>Moderate</td>
<td>No</td>
<td>CD</td>
<td>2345</td>
</tr>
<tr>
<td>7</td>
<td>OD ST</td>
<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
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<td>No</td>
<td>CD</td>
<td>5285</td>
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<tr>
<td>8</td>
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<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
<td>Moderate</td>
<td>Yes</td>
<td>CD</td>
<td>3160</td>
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<tr>
<td>9</td>
<td>OD ST</td>
<td>Sclera</td>
<td>Undulating</td>
<td>Rolling</td>
<td>Moderate</td>
<td>No</td>
<td>CD</td>
<td>1513</td>
</tr>
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</table>

**Table 2. Choroidal and Retinal Findings of Sclerochoroidal Calcification on Enhanced Depth Imaging Optical Coherence Tomography in 9 Patients With 13 Lesions**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Lesion Location in Fundus</th>
<th>Thickness of Choroid Overlying Lesion, μm</th>
<th>Outer Nuclear Layer</th>
<th>External Limiting Membrane</th>
<th>IS/OS Junction</th>
<th>Edema</th>
<th>Subretinal Fluid</th>
<th>RPE Thickness</th>
<th>Pigment Epithelial Detachment</th>
<th>Drusen</th>
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<tbody>
<tr>
<td>1</td>
<td>OD ST</td>
<td>31</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>No</td>
<td>No</td>
<td>Normal</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>OD SN</td>
<td>0</td>
<td>CD</td>
<td>CD</td>
<td>CD</td>
<td>No</td>
<td>No</td>
<td>Normal</td>
<td>No</td>
<td>No</td>
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<tr>
<td>3</td>
<td>OD IN</td>
<td>77</td>
<td>Normal</td>
<td>Normal</td>
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<td>No</td>
<td>Normal</td>
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<td>No</td>
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<td>Normal</td>
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<td>No</td>
<td>Normal</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>OD ST</td>
<td>0</td>
<td>Normal</td>
<td>Disrupted</td>
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<td>No</td>
<td>No</td>
<td>Thick</td>
<td>No</td>
<td>No</td>
</tr>
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<td>Normal</td>
<td>Normal</td>
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<td>Thick</td>
<td>No</td>
<td>No</td>
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<tr>
<td>7</td>
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<td>0</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>No</td>
<td>No</td>
<td>Thick</td>
<td>No</td>
<td>No</td>
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<tr>
<td>8</td>
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<td>0</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>No</td>
<td>No</td>
<td>Thin</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>OD ST</td>
<td>119</td>
<td>Normal</td>
<td>Normal</td>
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<td>No</td>
<td>No</td>
<td>Normal</td>
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</tbody>
</table>

**Table 1.** Lesion Findings of Sclerochoroidal Calcification on Enhanced Depth Imaging Optical Coherence Tomography in 9 Patients With 13 Lesions

**Table 2.** Choroidal and Retinal Findings of Sclerochoroidal Calcification on Enhanced Depth Imaging Optical Coherence Tomography in 9 Patients With 13 Lesions

Abbreviations: CD, cannot determine (posterior margin not visible or inadequate visualization); IN, inferonasal; IT, inferotemporal; SN, supronasal; ST, superotemporal.
ning or absence of the overlying choroid, documented on EDI-OCT, could have allowed for unmasking of underlying scleral hyperautofluorescence. Eleven of the 13 SC lesions were hyper-reflective on infrared reflectance imaging, consistent with reflectance from scleral collagen. Alternatively, intrinsic hyperautofluorescence of calcific tissue within SC may explain our fundus autofluorescence imaging findings.

The most remarkable finding on EDI-OCT was that all SC lesions originated from within the sclera, with thinning or absence of the overlying choroid. In addition, the irregular surface contour is unlike choroidal nevus or small melanoma, which display a gentle, uniform anterior slope. The rocky configuration may be unique to SC and, to our knowledge, has not previously been reported with other choroidal conditions on EDI-OCT. The inability to identify the posterior margin of each lesion may relate to the reflectivity of the calcific material, thickness, or both.

To our knowledge, there are only 2 reports of EDI-OCT of SC, and both had this rocky configuration. A clinicopathologic correlation of SC in 3 globes from 2 patients found 2 types of scleral calcification, including tophus-like conglomeration of calcium pyrophosphate crystals and diffuse noncrystalline calcification. The uvea was uninvolved except in one section where 2 large crystalline deposits were visualized projecting into the outer choroid. These pathologic observations correlate with our observations on the scleral localization of this condition on EDI-OCT.

The use of multimodal imaging can assist in establishing the diagnosis of SC. Six of the 9 patients (67%) were referred with a diagnosis other than SC. The differential diagnosis of SC includes choroidal osteoma, metastasis, amelanotic nevus or melanoma, lymphoma, and granuloma. One main dissimilarity is that these lesions arise primarily from the choroid, whereas SC appears to be primarily a scleral rather than sclerochoroidal condition.

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Author Contributions: Dr C. L. Shields had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of Interest Disclosures: None reported.

Funding/Support: This work was supported by the Eye Tumor Research Foundation, Philadelphia, Pennsylvania (Drs C. L. Shields and J. A. Shields).

Retinal Vascular Precipitates During Administration of Melphalan Into the Ophthalmic Artery

We describe the real-time ophthalmic findings during 3 consecutive bilateral superselective intraophthalmic artery chemotherapy treatments in a 5-month-old baby with retinoblastoma.

Methods | After obtaining informed consent, 3 bilateral superselective intraophthalmic artery chemotherapy treatments were performed 1 month apart, following a previously described protocol.1 Each infusion consisted of 2.5 mg of melphalan in 30 mL of saline at a rate of 1 mL/min for 30 minutes per eye. A RetCam 1300 lens (Clarity Medical Systems) was used to take serial fundus photographs and videos. The frequency of the imaging was adjusted according to the findings. Care was taken to avoid applying pressure to the eye.

Results | First Treatment. Results of the first treatment were reported in detail elsewhere.1 In the right eye, signs of widespread chorioretinal ischemia including pulsatile pallor of the optic nerve, sectoral choroidal blanching, retinal arterial thinning, and intra-arterial retinal precipitates (IARPs) were noticed 16 minutes into the infusion. The infusion was immediately aborted and the IARPs persisted for 4.5 minutes. In the left eye, pulsatile pallor of the optic nerve, sectoral choroidal blanching, and marked retinal arterial thinning followed by loss of the blood column along the arterial and venous tree were intermittently recorded during the infusion. Immediate revascularization was noticed following temporary interruption of the infusion. No IARPs were detected. Treatment was completed.

Second Treatment. In the right eye, IARPs were noticed 8.5 minutes into the treatment. The infusion was immediately withheld. The IARPs persisted for 9.5 minutes. When clinical chorioretinal reperfusion was detected, the treatment was re-instituted and completed uneventfully (Figure 1). In the left eye, findings were similar to those of the first treatment.

Third Treatment. In the right eye, IARPs were noticed 28 minutes into the treatment. The treatment was aborted. The IARPs persisted for 11 minutes. In the left eye, the first episode of IARPs was recorded 20 minutes into the infusion and lasted 9 minutes. When complete chorioretinal reperfusion was clinically noticed, the infusion was continued (Figure 2, Video 1, and Video 2). A second ischemic episode with IARPs was recorded immediately after reinstitution of treatment, lasting 7 minutes. Treatment was aborted.

Figure 1. Serial Fundus Photographs Taken During the Second Intra-arterial Treatment of the Right Eye

A, Intra-arterial retinal precipitates were noticed 8.5 minutes into the treatment, affecting all 4 quadrants. B, Following abortion of treatment, reperfusion proceeded centrifugally in a pulsatile manner. C, The posterior pole was reperfused within the first 90 seconds. D, Full reperfusion of the posterior pole and peripheral retina was noticed clinically 9.5 minutes later.