ICG-A Reveals Subclinical Choroidal Changes in Patients with Metastatic Malignant Disease

Objective

The purpose of this poster is to characterize unique ICG-A findings in 5 cancer patients with established systemic malignancies.

Methods

Five patients with systemic malignancies underwent complete ophthalmic examination including fluorescein and pulse ICG angiography as part of a metastatic work-up. Four of five patients had previously identified metastatic vascular disease in at least one eye (lung, breast), while the fifth was grossly uninvolved O/C (skin melanoma).

Results

Eyes with normal findings on clinical fundoscopy or fluorescein angiography revealed patchy multifocal hyperfluorescent streaks in the posterior pole or mid-periphery in the late inversion phase of ICG-A.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Primary Malignancy</th>
<th>Sex</th>
<th>Age</th>
<th>Site of Metastasis</th>
<th>Interval of Y</th>
<th>Pulse ICG-A Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;br&gt;Lung Cancer&lt;br&gt;[Non-small cell carcinoma]&lt;br&gt;Thoracic, Choroidal&lt;br&gt;Mass&lt;br&gt;5 molts</td>
<td>Female</td>
<td>47</td>
<td>Thorough Choroidal&lt;br&gt;Mass</td>
<td>8 mols</td>
<td>1 week</td>
<td>Posterior Polypathy, multifocal hyperfluorescent streaks in the macula OS (1.1-1.3); normal fundoscopy and fluorescein angiography were normal OU (2.2-2.5). Pulse ICG-A (2.6) revealed diffuse peripapillary hyperfluorescence OD (2.7-2.8). Subtle, diffuse multifocal streaks of hyperfluorescence in the midperiphery.</td>
</tr>
<tr>
<td>2&lt;br&gt;Breast Cancer&lt;br&gt;[Hormone responsive].&lt;br&gt;Bone&lt;br&gt;3 molts</td>
<td>Male</td>
<td>57</td>
<td>Isolane Choroidal&lt;br&gt;Mass</td>
<td>5 mols</td>
<td>1 week</td>
<td>Posterior Polypathy, multifocal hyperfluorescent streaks OS (1.1-1.3). Normal fundoscopy and fluorescein angiography were normal OU (2.2-2.5). Pulse ICG-A revealed patchy multifocal hyperfluorescent streaks in the periphery OU.</td>
</tr>
<tr>
<td>3&lt;br&gt;Breast Cancer&lt;br&gt;[Hormone responsive].&lt;br&gt;Bone&lt;br&gt;2 molts</td>
<td>Female</td>
<td>36</td>
<td>Bone&lt;br&gt;Mass</td>
<td>34 mols</td>
<td>2 weeks</td>
<td>Posterior Polypathy, multifocal hyperfluorescent streaks OS (1.1-1.3); normal fundoscopy and fluorescein angiography were normal OU (2.2-2.5). Pulse ICG-A revealed complex multifocal hyperfluorescent streaks in the periphery OS.</td>
</tr>
<tr>
<td>4&lt;br&gt;Breast Cancer&lt;br&gt;[Breast cancer].&lt;br&gt;Bone&lt;br&gt;3 molts</td>
<td>Male</td>
<td>52</td>
<td>Breast, Choroidal&lt;br&gt;Mass</td>
<td>24 mols</td>
<td>1 week</td>
<td>Polyephyalic polypathy, multifocal hyperfluorescent streaks OU.</td>
</tr>
<tr>
<td>5&lt;br&gt;Skin Cancer&lt;br&gt;[皮肤melanoma].&lt;br&gt;Dermal Metastasis&lt;br&gt;0 molts</td>
<td>Male</td>
<td>60</td>
<td>Dermal Metastasis</td>
<td>5 mols</td>
<td>4 weeks</td>
<td>Peripheral polypathy, multifocal hyperfluorescent streaks OU.</td>
</tr>
</tbody>
</table>

Discussion

Five patients with systemic carcinoma and ocular tumor metastases were examined with IV-FA and pulse ICG-A. All five demonstrated a specific ICG-A pattern of Patchy Multifocal Hyperfluorescent Streaks (PMHS) of the choroid, noted as an incidental finding. The PMHS pattern was not contiguos with clinically observable metastatic tumor lesions of the posterior segment, and always appeared as a discrete area of choroidal involvement. Stephens & Shields (Ophthalmology 1979) found that the choroid was the most likely part of the eye to be first involved by metastatic tumors (93% of cases on histopathology). They found that metastatic eye disease presented first 33% of the time, while the primary tumor presented first 66% of the time. There was a striking difference by tumor type, with breast cancer presenting in the eye first only 12.8% of the time, while lung cancer presented in the eye first 70% of the time. Histopathologic review of metastatic breast cancer reveals tumor cells within the choroid with an acinar structure, filled with mucin centrally. Lung cancer metastatic to the choroid demonstrates cords and lobules of tumor, often containing vacuoles of mucin-like material. As ICG dye is known to be lipophilic, we speculate that this pattern of increased relative fluorescence on pulse ICG-Amy represent: • biochemical bonding of ICG to mucinous material within additional, but not yet clinically evident, focus of metastasis; • a change in vascular leakage due to a modification of the choroidal vascular phenotype which can be induced by metastatic tumors; • alteration of a hypothetical transport mechanism within the retinal vascular-RPE-choroidal complex capable of moving ICG dye more rapidly into the choroidal capsular interstitial space when compromised by early metastatic disease, or • the influence of circulating serum tumor antibodies on the choroidal vasculature, a potential remote effect of cancer.

Conclusions

• Unique, sub-clinical ICG angiographic findings (PMHS) were revealed in patients with known malignancy. These areas were identified from survey photographs exposed during late phase pulse ICG-A.

• The etiology of these hyperfluorescent fundus lesions is inconclusive. They may represent early metastatic disease, tumor recurrence or regression, choroidal infiltration, or autoimmune related cancer associated retinopathy (CAR).

• We suggest that a pulse ICG angiogram with a photographic survey of the posterior pole and periphery of both eyes be performed in patients undergoing diagnostic evaluation of cancer.

References


4. Dartmouth-Hitchcock Medical Center.

5. Dartmouth-Hitchcock Medical Center.