Objective: To describe baseline night vision symptoms and their association with ≥3-lines loss in visual acuity (VA), choroidal neovascularization (CNV), and geographic atrophy (GA).

Design: Cohort study within a multicenter randomized clinical trial.

Participants: A total of 1052 participants with ≥10 large (>125 μ) drusen and VA ≥20/40 in each eye.

Methods: At baseline, participants self-administered a 10-item Night Vision Questionnaire (NVQ-10). VA testing was performed at baseline, 6 months, and annually. One eye of each participant was randomly assigned to laser treatment, and the contralateral eye was assigned to observation. During follow-up, trained readers identified CNV on the basis of fluorescein angiograms and end point GA, defined as >1 disc area of new GA, based on color photographs. Evaluation was performed by repeated-measures logistic regression for NVQ-10 score as a risk factor for ≥3-lines loss in VA and by survival analysis for CNV and GA, with and without adjustment for participant and ocular characteristics. Evaluations were based on observed eyes and treated eyes, considered separately and combined.

Main Outcome Measures: A ≥3-lines loss in VA, development of CNV and end point GA.

Results: At baseline, NVQ-10 scores ranged from 3 to 100 with a mean of 70 (100 corresponds to no night vision symptoms). Compared with participants with the best night vision (fourth quartile of scores), participants with the worst night vision (first quartile of scores) were at increased risk of ≥3-lines loss in VA in both observed and treated eyes; odds ratios (95% confidence interval) were 2.85 (1.85–4.39) and 2.00 (1.27–3.14), respectively. The relative risk for the first quartile versus the fourth quartile for development of GA was 4.18 (1.80–9.68) in observed eyes and 2.59 (1.13–5.95) in treated eyes. The relative risk for CNV incidence was 1.99 (1.12–3.54) in observed eyes and 1.33 (0.81–2.19) in treated eyes. These relationships were maintained after adjustment for baseline participant and ocular characteristics.

Conclusions: Participants who perceived the most problems in their night vision at baseline had an increased risk of ≥3-lines loss in VA, CNV, and GA. These associations are independent of established risk factors.

Financial Disclosure(s): The authors have no proprietary or commercial interest in any materials discussed in this article. Ophthalmology 2008;xx:xxx © 2008 by the American Academy of Ophthalmology.
sary for continued cone survival because rods produce a diffusible substance essential for cone survival. Thus, dysfunction of rod photoreceptors may serve as an indicator for impending cone dysfunction.

Because of the body of evidence that rod dysfunction and resulting problems with night vision may indicate more advanced age-related maculopathy and higher risk of vision loss from progression to the late stage of the disease, we administered a 10-item questionnaire on night vision to participants enrolling in the Complications of AMD Prevention Trial (CAPT). CAPT was a multicenter clinical trial sponsored by the National Eye Institute to evaluate the efficacy and safety of low-intensity laser treatment in preventing loss of vision in people with bilateral large drusen. Participants were followed longitudinally; VA was measured annually, and development of choroidal neovascularization was assured for at least 5 years. The CAPT found that light-intensity laser treatment did not reduce the risk of the development of CNV, GA, or loss of VA. This article seeks to assess whether baseline night vision symptoms predict subsequent vision loss and development of CNV and GA in CAPT participants.

Materials and Methods

Details of the design and methods have been reported elsewhere; only the major features related to this article are described here. Participants were enrolled through 22 clinical centers. The institutional review board associated with each center approved the study protocol, and written informed consent was obtained from each participant. Data management was compliant with Health Insurance Portability and Accountability Act guidelines. The conduct of the clinical trial adhered to the tenets of the Declaration of Helsinki. A total of 1052 participants were enrolled between May of 1999 and March of 2001. Both eyes of the participants were enrolled in the CAPT; one eye of each participant was randomized to laser treatment, with the contralateral eye assigned to observation. CAPT eligibility criteria specified that each eye have ≥10 large drusen (≥125 μ in diameter) and VA ≥20/40. Neither eye was to have evidence of CNV, serous pigment epithelial detachment, GA within 500 μ of foveal center or total area >1 Macular Photocoagulation Study disc area, or other ocular conditions that were likely to compromise VA or contraindicate application of laser treatment.

During the initial visit, participants provided information on demographic characteristics, history of diabetes mellitus, history of cigarette smoking, current use of aspirin, and current use of antihypertensive medications. Blood pressure was measured one time while the participant was seated. During the initial visit and follow-up visits, VA was measured following the procedures developed for the Early Treatment Diabetic Retinopathy Study as adapted for the Age-Related Eye Disease Study. Modified Early Treatment Diabetic Retinopathy Study Charts 1 and 2 were used at a distance of 3.2 m. Scoring of the VA test was based on the number of letters read correctly. The range of possible scores was 0 to 95, corresponding to Snellen VA equivalents of <20/800 to 20/12.

At the initial visit and annually thereafter, certified photographers adhering to a standardized protocol for field definition and image sequencing took stereoscopic, color fundus photographs on film and a fluorescein angiogram on film, with frames from each eye. Color photographs were also taken at 6 months. All photographic images were graded independently by 2 trained readers in the CAPT Reading Center who later openly discussed their discrepancies to arrive at consensus. At baseline, the fundus features described in the grading included the number of drusen, largest drusen size, percent of area covered by drusen, drusen confluence, focal hyperpigmentation, and RPE depigmentation.

Readers in the CAPT Reading Center also evaluated the follow-up images for the presence of CNV and GA. Fluorescein angiograms were used to identify CNV, defined as expansion or persistent staining of an area of hyperfluorescence as the time from injection increased. GA was considered present when the color photographs showed an area of atrophy of the RPE with a diameter of at least 250 μ with 2 of the following 3 features: visible chorioidal vessels, sharp edges, and a more or less circular shape.

Ten-Item Night Vision Questionnaire

CAPT participants completed the 25-item National Eye Institute Visual Functioning Questionnaire at the initial visit. Participants also completed 6 items concerning night vision based on a symptom list designed by Cynthia Owsley, PhD, and Samuel Jacobson, MD, PhD, for patients with AMD. The 4 items concerning night vision from the 25-item National Eye Institute Visual Functioning Questionnaire and the 6 items on night vision symptoms are referred to as the 10-item Night Vision Questionnaire (NVQ-10) (Appendix 2, available at http://aaojournal.org). The first 4 items are on a 5-point scale from “None” to “Stopped doing because of my eyesight” and ask about the difficulty in seeing moving subjects, reading street signs when driving at night, difficulty in seeing street signs as a passenger in the car at night, and difficulty with the oncoming headlights or streetlights when driving at night. The next 6 items are on a 4-point scale from “Not at all” to “Very” and ask about how bothered the participant is by poor vision at night, problem in reading in dim light, a dark spot in the middle of vision in dim light, poor vision in dim lighting, problems adjusting to the dark when entering a theater, and trouble seeing the stars in the sky at night. Each item is scored between 100 (none or not at all) and 0 (stopped doing because of eyesight or very bothered). An item cannot be scored if the participant answered with “not currently driving” or “Stopped doing this for other reasons or not interested in doing this.” An overall NVQ-10 score for each participant based on the average score of the items with a score (i.e., excluding items that cannot be scored) is expressed on a scale range from 0 to 100; lower score indicates worse night vision.

The questionnaires were self-administered during the initial visit. The local clinic coordinator reviewed the instructions with the participant and answered any questions that arose for participants self-administering the questionnaires. On completion, the clinic coordinator immediately reviewed the form to ensure that all questions were answered and the responses were legible. If any problems were identified, the clinic coordinator requested that the participant complete or revise missing or illegible responses.

Statistical Analysis

Hypertension was classified according to the blood pressure measured at initial visit and the reported use of antihypertensive medications. Definite hypertension was defined as systolic blood
Night Vision Symptoms Predict Risk for Vision Loss, CNV, and GA

Ying et al.

Results

NVQ-10 Score at Baseline

At baseline, 1051 of 1052 CAPT participants completed the NVQ-10. The distribution of NVQ-10 scores shows that many CAPT participants reported problems with their night vision (Fig 1). The mean (± standard deviation) NVQ-10 score was 70 (±20), and the median was 73 (range, 3–100). Forty-two participants (4.0%) reported no problems with night vision and attained the maximum NVQ-10 score of 100. The NVQ-10 score ranged from 3 to 57 (mean, 42.1) in the first quartile, 58 to 73 (mean, 66.8) in the second quartile, 74 to 85 (mean, 79.8) in the third quartile, and 86 to 100 in the fourth quartile (mean, 93.1) (Fig 1). The NVQ-10 items showed strong internal consistency and reliability with Cronbach’s α = 0.90.

Association with Visual Acuity

When participants were compared on the basis of the quartiles of NVQ-10, the participants with the best night vision (in the fourth quartile of NVQ-10) had the lowest proportions of observed eyes with ≥3-lines loss in VA at every visit when VA was measured (Fig 2). Participants with the worst night vision (in the first quartile) generally had the highest proportion of observed eyes with ≥3-lines loss, although the differences among the first 3 quartiles were not large (Fig 2). The association between loss in VA and quartiles of night vision scores followed a similar pattern in treated eyes (data not shown). Compared with participants with the best night vision (in the fourth quartile), participants with worse night vision at baseline (in the first, second, or third quartiles) had at least a 2-fold increased risk of vision loss ≥3-lines in observed eyes. This significant association was maintained after adjustment by the other factors significantly associated with loss of VA (age, current smoking status, hypertension, and focal hyperpigmentation) (Table 1). Weaker associations were seen in the treated eyes and in the combined set of observed and treated eyes.

Figure 1. Distribution of night vision scores calculated from the NVQ-10 administered at baseline. Scores were scaled from 0 to 100, with 100 indicating no night vision symptoms. Ranges of the 4 quartiles (Q1, Q2, Q3, and Q4) are shown.

Figure 2. Proportion of observed eyes with ≥3-lines loss in VA across follow-up time by quartiles of the night vision score from the NVQ-10. The proportion of observed eyes with ≥3-lines loss in VA is significantly different among the 4 quartiles of night vision score (P < 0.0001).
Interaction between treatment assignment and quartiles of night vision score was not found ($P = 0.63$).

**Association with Choroidal Neovascularization**

The proportion of participants developing CNV in their observed eye, regardless of the length of follow-up, was lowest for the participants in the fourth quartile of night vision scores (least reported night vision problems) (Table 2). These crude proportions and the Kaplan–Meier estimates of the cumulative proportion of developing CNV (Fig 3) for the other 3 quartiles did not differ consistently over time and did not exhibit a clear dose-response pattern. The relative risk for each of the 3 groups was approximately 2, and adjustment for the other risk factors for CNV in the CAPT participants (age, current smoking status, hypertension, and focal hyperpigmentation) resulted in only minor changes in the estimated relative risks (Table 2). In treated eyes, worse night vision (lower quartile number) was associated with slightly increased risk of CNV (Table 2). Interaction between treatment assignment and night vision score (4 categoric levels) was not found ($P = 0.34$).

### Table 1. Association of 10-Item Night Vision Questionnaire Score at Baseline with Risk of $\geq$-3-lines Loss in Visual Acuity in Follow-up

<table>
<thead>
<tr>
<th>NVQ-10 Quartile</th>
<th>Observed Eyes</th>
<th>Treated Eyes</th>
<th>Combined*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR† (95% CI)</td>
<td>OR† (95% CI)</td>
<td>OR† (95% CI)</td>
</tr>
<tr>
<td><strong>Univariate Analysis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First (lowest)</td>
<td>2.85 (1.85–4.39)</td>
<td>2.00 (1.27–3.14)</td>
<td>2.39 (1.69–3.40)</td>
</tr>
<tr>
<td>Second</td>
<td>2.54 (1.62–3.97)</td>
<td>2.04 (1.31–3.17)</td>
<td>2.27 (1.39–3.24)</td>
</tr>
<tr>
<td>Third</td>
<td>2.14 (1.39–3.32)</td>
<td>1.78 (1.13–2.81)</td>
<td>1.95 (1.36–2.79)</td>
</tr>
<tr>
<td>Fourth (highest)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Overall P value</strong>&lt;0.0001</td>
<td>0.0002</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td><strong>Adjusted Analysis‡</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First (lowest)</td>
<td>2.67 (1.69–4.22)</td>
<td>1.50 (0.94–2.39)</td>
<td>2.02 (1.41–2.89)</td>
</tr>
<tr>
<td>Second</td>
<td>2.48 (1.55–3.95)</td>
<td>1.75 (1.12–2.74)</td>
<td>2.08 (1.46–2.97)</td>
</tr>
<tr>
<td>Third</td>
<td>2.14 (1.36–3.36)</td>
<td>1.69 (1.08–2.65)</td>
<td>1.90 (1.33–2.71)</td>
</tr>
<tr>
<td>Fourth (highest)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Overall P value</strong>&lt;0.0001</td>
<td>0.0001</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
</tbody>
</table>

CI = confidence interval; NVQ-10 = 10-item night vision questionnaire; OR = odds ratio; VA = visual acuity.

*Also adjusted by the assigned treatment.

†Repeated measures logistic regression.

‡Adjusted by age, current smoking status, hypertension, and focal hyperpigmentation.

### Table 2. Association of 10-Item Night Vision Questionnaire Score at Baseline with Risk of Choroidal Neovascularization in Follow-up

<table>
<thead>
<tr>
<th>NVQ-10 Quartile</th>
<th>Observed Eyes</th>
<th>Treated Eyes</th>
<th>Combined*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>CNV (%)</td>
<td>n</td>
</tr>
<tr>
<td><strong>First (lowest)</strong></td>
<td>267</td>
<td>35 (13.1)</td>
<td>266</td>
</tr>
<tr>
<td><strong>Second</strong></td>
<td>267</td>
<td>45 (16.9)</td>
<td>266</td>
</tr>
<tr>
<td><strong>Third</strong></td>
<td>261</td>
<td>43 (16.5)</td>
<td>259</td>
</tr>
<tr>
<td><strong>Fourth (highest)</strong></td>
<td>248</td>
<td>18 (7.26)</td>
<td>248</td>
</tr>
<tr>
<td><strong>RR† (95% CI)</strong></td>
<td>1.99 (1.12–3.54)</td>
<td>1.33 (0.81–2.19)</td>
<td>1.59 (1.05–2.41)</td>
</tr>
<tr>
<td><strong>Second</strong></td>
<td>2.50 (1.44–4.34)</td>
<td>1.34 (0.81–2.19)</td>
<td>1.79 (1.18–2.71)</td>
</tr>
<tr>
<td><strong>Third</strong></td>
<td>2.36 (1.36–4.12)</td>
<td>1.27 (0.77–2.09)</td>
<td>1.70 (1.13–2.56)</td>
</tr>
<tr>
<td><strong>Fourth (highest)</strong></td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Overall P value</strong>&lt;0.0001</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td><strong>Adjusted Analysis‡</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First (lowest)</td>
<td>1.92 (1.08–3.44)</td>
<td>1.07 (0.64–1.78)</td>
<td>1.41 (0.92–2.16)</td>
</tr>
<tr>
<td>Second</td>
<td>2.38 (1.36–4.14)</td>
<td>1.15 (0.69–1.91)</td>
<td>1.63 (1.06–2.48)</td>
</tr>
<tr>
<td>Third</td>
<td>2.29 (1.31–4.00)</td>
<td>1.22 (0.74–2.01)</td>
<td>1.64 (1.08–2.49)</td>
</tr>
<tr>
<td>Fourth (highest)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Overall P value</strong>&lt;0.01</td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
</tr>
</tbody>
</table>

CI = confidence interval; CNV = choroidal neovascularization; NVQ-10 = 10-item night vision questionnaire; RR = risk ratio.

*Also adjusted by the assigned treatment.

†Cox proportional hazards model.

‡Adjusted by age, current smoking status, hypertension, and focal hyperpigmentation.
Association with Geographic Atrophy

The proportion of participants developing GA in their observed eye, regardless of the length of follow-up, was lower for the participants in the third and fourth quartiles of night vision scores (least reported problems) than for the participants in the first and second quartiles (Table 3). The cumulative incidence estimate of GA from the competing risk model (Fig 4) also showed a large difference between quartiles 1 and 2 versus quartiles 3 and 4. The unadjusted relative risk for each of the first and second quartiles was 4.2 and 3.1, respectively. With adjustment for the other risk factors for GA in the CAPT participants (age, hypertension, larger area of drusen, focal hyperpigmentation, and RPE depigmentation), the estimated relative risks increased to 4.6 and 3.2, respectively. In treated eyes, there was a similar trend for the incidence of GA in quartiles 1 and 2 and within quartiles 3 and 4 (Table 3). Interaction between treatment assignment and quartiles of night vision score was not found ($P = 0.52$).

**Discussion**

The data from CAPT show that many patients with multiple large drusen bilaterally and good VA ($\geq 20/40$) have reported night vision symptoms, and that more night vision symptoms

---

**Table 3. Association of 10-Item Night Vision Questionnaire Score at Baseline with Risk of Geographic Atrophy in Follow-up**

| NVQ-10 Quartile | Observed Eyes | | Treated Eyes | | Combined* | |
|----------------|---------------|----------------|---------------|----------------|----------------|
|                | n             | GA (%)         | n             | GA (%)         | n             | GA (%)         |
| First (lowest) | 247           | 26 (10.5)      | 250           | 19 (7.60)      | 497           | 45 (9.05)      |
| Second         | 250           | 20 (8.00)      | 254           | 21 (8.27)      | 504           | 41 (8.13)      |
| Third          | 251           | 8 (3.19)       | 250           | 10 (4.00)      | 501           | 18 (3.59)      |
| Fourth (highest)| 240           | 7 (2.92)       | 244           | 8 (3.28)       | 484           | 15 (3.10)      |

<table>
<thead>
<tr>
<th>Univariate Analysis</th>
<th>RR$^\dagger$ (95% CI)</th>
<th>RR$^\dagger$ (95% CI)</th>
<th>RR$^\dagger$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (lowest)</td>
<td>4.18 (1.80–9.68)</td>
<td>2.59 (1.13–5.95)</td>
<td>3.32 (1.69–6.53)</td>
</tr>
<tr>
<td>Second</td>
<td>3.10 (1.30–7.37)</td>
<td>2.72 (1.20–6.18)</td>
<td>2.90 (1.46–5.76)</td>
</tr>
<tr>
<td>Third</td>
<td>1.16 (0.42–3.22)</td>
<td>1.22 (0.48–3.10)</td>
<td>1.20 (0.55–2.61)</td>
</tr>
<tr>
<td>Fourth (highest)</td>
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<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Overall P value</td>
<td>0.0005</td>
<td>0.02</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjusted Analysis$^\ddagger$</th>
<th>RR$^\dagger$ (95% CI)</th>
<th>RR$^\dagger$ (95% CI)</th>
<th>RR$^\dagger$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (lowest)</td>
<td>4.60 (1.81–11.6)</td>
<td>2.44 (1.03–5.77)</td>
<td>3.42 (1.69–6.96)</td>
</tr>
<tr>
<td>Second</td>
<td>3.17 (1.23–8.18)</td>
<td>2.97 (1.27–6.93)</td>
<td>3.10 (1.50–6.40)</td>
</tr>
<tr>
<td>Third</td>
<td>1.16 (0.38–3.53)</td>
<td>1.33 (0.51–3.45)</td>
<td>1.22 (0.54–2.79)</td>
</tr>
<tr>
<td>Fourth (highest)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Overall P value</td>
<td>0.001</td>
<td>0.03</td>
<td>0.0008</td>
</tr>
</tbody>
</table>

CI = confidence interval; GA = geographic atrophy; NVQ-10 = 10-item night vision questionnaire; RR = risk ratio.

$^\dagger$Also adjusted by the assigned treatment.

$^\ddagger$Cox proportional hazards model.

$^\ddagger$Adjusted by age, hypertension, global area covered by drusen, focal hyperpigmentation, and RPE depigmentation.
are associated with an increased risk of developing loss in VA, CNV, and GA. Furthermore, the associations are independent of other risk factors, including participant and ocular characteristics. These findings are consistent with the biological and psychophysical findings that rod photoreceptor degeneration precedes cone degeneration in early AMD, and that rod dysfunction may contribute to the later degeneration of cones because of their interdependence. The predictive value of night vision symptoms on late AMD development is in agreement with the findings from a study by Sunness et al on a small group of patients with drusen, in which the degree of loss of foveal dark-adapted sensitivity at baseline predicted the development of advanced AMD with 100% sensitivity and 92% specificity.

Results from previous studies have established several risk factors for progression to CNV and GA. The risk factors identified within the CAPT data were consistent with previous findings for increased risk with the personal characteristics of advanced age, current cigarette smoking, and hypertension, and the ocular characteristics of drusen area, focal hyperpigmentation, and RPE depigmentation. The results of the analyses presented in this article support night vision symptoms as a novel risk factor of vision loss and development of CNV and GA. It is interesting to note that the association of CNV and GA with night vision symptoms seems different. As shown in Figure 3, the risk of CNV in the fourth quartile is lower than that from the first 3 quartiles, and the risk of CNV in the first 3 quartiles does not show a dose-response pattern, whereas the risk of GA in the third and fourth quartiles is similar, which is much lower than that in the first and second quartiles (Fig 4). These results imply that the CNV and GA may arise from 2 different disease physiologic processes.

The assessment of night vision symptoms provides additional valuable predictive information, because it is independent of the effects of established ocular and other participant risk factors. During the period that CAPT was being performed, Owsley et al developed the 32-item Low-Luminance Questionnaire to characterize the vision problems in low luminance and found that the Low-Luminance Questionnaire scores were related to rod-mediated dark adaptation parameters but not to cone-mediated parameters. Because of the ease of ascertainment compared with testing dark adaptation or rod sensitivity, assessing night vision symptoms may be useful in identifying patients with early or intermediate AMD who are at a relatively high risk of progression. Several agents are currently under evaluation in clinical trials as treatments to prevent the development or progression of GA. Including only patients with night vision symptoms, and therefore higher risk of progression and loss of vision, would be one way to decrease the risk–benefit ratio in these clinical trials and to decrease the total sample size or follow-up period required to attain a specific amount of statistical power.

References


Footnotes and FinancialDisclosures

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1 Department of Ophthalmology, School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.
2 Charlotte Eye, Ear, Nose and Throat Associates, Charlotte, North Carolina.


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Correspondence:
Gui-shuang Ying, PhD, University of Pennsylvania, 3535 Market Street, Suite 700, Philadelphia, PA 19104-3309.

* A listing of the Complications of Age-related Macular Degeneration Prevention Trial Research Group is in Appendix 1 (available at http://aaojournal.org).
Appendix 1: Complications of Age-related Macular Degeneration Prevention Trial Research Group

Retinal Consultants of Arizona
Mesa and Sun City, AZ
Donald W. Park, MD
Pravin V. Dugel, MD
Allen B. Thach, MD
Siru Adhikari
Christina Alvarado
Jennifer Blaisdell
Jennifer Cavanaugh
Jennifer Cornelius
Elena Marcos
Kaz Tysiak
Norma Jimenez
Adriana Falcon
Sharon Kosecki
Elena Marcos
Carol Slagle
Cheri Tuttle
Scott E. Bohnen
Brian M Manor
John Martin
Anne C. Monday

West Coast Retina
San Francisco, CA
Robert N. Johnson, MD
Everett Ai, MD
H. Richard McDonald, MD
Irina Rozenfeld, MD
Margaret Stolarzuk, OD
Pat Wood, LVN, CCRS
Kevan Curren, COA
Irina Rozenfeld, MD
Brantli Teske, COA
Marsha Apushkin
Silvia Linares
Kelly DeBoer
Sarah Huggans
Jeremy Miller
John Uy

Northwestern University
Chicago, IL
Alice Lyon, MD
Susan Anderson-Nelson, MD
Lee M. Jampol, MD
David V. Weinberg, MD
Annie Mufana, RN
Zuzanna Rozenbagier, MA
Lori Kaminski, RN
Jill Koechber
Latina O’Donnell
Renata Swigost
Lisa Volland, RN
Marsha Apushkin
Alexander Habib
Pamela Hulvey
Jonathan Shankle
James Yuhr

Illinois Retina Associates
Harvey and Skokie, IL
University of South Florida Eye Institute
Tampa, FL
Peter Reed Pavan, MD
Karina K. Billiris, MD
Burton Goldstein, MD
Mohan Iyer, MD
Matthew M. Menosky, MD
Jonathan Mines, MD
Scott E. Paultier, MD
Sharon M. Millard, RN, COT
Susan Sherouse, COT
Michelle D. West, COT
Steve Carlton
Wyatt Saxon

Emory Eye Center
Atlanta, GA
Paul Sternberg Jr, MD
Thomas Aaberg Sr, MD
Baker Hubbard III, MD
David Saperstein, MD
Lindy DuBois, MEd, MMSc, CO, COMT
Ann Ervin, MPH
Judy Brower, MMSc, CO, COMT
Jayne Brown
Guy Browne
Gabriela Burian
Natalie Schmitz
Rhonda Waldron, MMSc, COMT
James Gilman, CRA
Bob A. Myles

Ophthalmology and Visual Sciences at the University of Louisville
Louisville, KY
Charles C. Barr, MD
Steve Bloom, MD
Brian Kritchman, MD
Greg Whittington, PsyS
Rhonda Bowyer
Dee Denning, COT
Janice Goatley
Janet Nutting
Judy Swartz
Evelyn Temple
Wendy Wilson, COT

Ophthalmic Consultants of Boston
Boston, MA
Jeffrey Heier, MD
Albert R. Frederikson Jr, MD
Michael G. Morley, MD
Trexler Topping, COT
Tammy Hanner, COA
Molly Doherty
Heather L. Davis
Linda Beal, COA
Sean Mahoney, COA
Robin A. Ty
Cullen Mike Jones, COA
Elisa Rapp, RN, COT, CRA

David Orth, MD
Jack Cohen, MD
Matthew Macumber, MD
Pauline Merrill, MD
Celeste Figliulo
Liz Porcz
Carrie L. Violetto, CMA
Tana N. Dreifus
Hope P. Nenadov
Laurie Rago
Donald Doherty
Marian McVicker
David Nash

University of Iowa Hospitals and Clinic
Iowa City, IA
James C. Folk, MD
H. Culver Boldt, MD
Karen M. Gehrs, MD
Stephen R. Russell, MD
Rachael Ivins, CCRC
Steven A. Wallace
Connie Hinze, COT
Michael Harker
Ed Heffron
Stefani Karakas
Jacquelyn M. McDonald
Jon Dahl
Timothy Holle
Matt Raeber
John Mark Rogers

Southeast Clinical Research Associates
Charlotte, NC
Andrew N. Antoszyk, MD
David J. Browning, MD, PhD
Tonia Ellsmore, CRC
Jennifer V. Helms, CCRC
Lori Lundy, COMT
Alison H Stallings
Lorraine Clark
Sandy Efrid, COT
Mark Evans
Fereshteh Jarrahi
Kara Mundy
Heather Murphy
Tisha L. O’Marah
Jennifer Wilke, COA
Patricia Woodland
Linda Davis
Mike McOwen

Retina-Vitreous Center
Edison and Lakewood, NJ
Steven R. Leff, MD
Erie Friedman, MD
Stuart N. Green, MD
Bruce Keyser, MD
Miriam Kushner, MD
David L. Yarian, MD
Cheryl Hambrock, RN
Appendix 2: Ten-Item Night Vision Related Questionnaire

1. How difficult is it for you to see moving objects, such as people or other cars when driving at night? Would you say you have:
   - No difficulty at all…………………………..1
   - A little difficulty ……………………………..2
   - Moderate difficulty ……………………………..3
   - Extreme difficulty……………………………..4
   - Stopped doing this because of your eyesight ……..5
   - Stopped doing this for other reasons
     or not interested in doing this ……………………..6
   - Not currently driving ……………………………..7

2. How difficult do oncoming headlights or streetlights make it for you to drive at night? Would you say you have:
   - No difficulty at all…………………………..1
   - A little difficulty ……………………………..2
   - Moderate difficulty ……………………………..3
   - Extreme difficulty……………………………..4
   - Stopped doing this because of your eyesight ……..5
   - Stopped doing this for other reasons
     or not interested in doing this ……………………..6
   - Not currently driving ……………………………..7

3. How difficult is it for you to read street signs when driving at night? Would you say you have:
   - No difficulty at all…………………………..1
   - A little difficulty ……………………………..2
   - Moderate difficulty ……………………………..3
   - Extreme difficulty……………………………..4
   - Stopped doing this because of your eyesight ……..5
   - Stopped doing this for other reasons
     or not interested in doing this ……………………..6
   - Not currently driving ……………………………..7

4. How difficult is it for you to see street signs when you are a passenger in the car at night? Would you say you have:
   - No difficulty at all…………………………..1
   - A little difficulty ……………………………..2
   - Moderate difficulty ……………………………..3
   - Extreme difficulty……………………………..4

Following are some additional characteristics of vision. Tell us how bothered you are by these items:

   (Circle one on each line)

<table>
<thead>
<tr>
<th>Item</th>
<th>Not at all bothered</th>
<th>A little bothered</th>
<th>Somewhat bothered</th>
<th>Very bothered</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Poor vision at night</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>Problem in reading in dim light</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>A dark spot in the middle of my vision in dim light</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8.</td>
<td>Poor vision in dim lighting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Problems adjusting to the dark when entering a theater</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Trouble seeing the stars in the sky at night</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>