Comparison of Prevalence of Diabetic Macular Edema Based on Monocular Fundus Photography vs Optical Coherence Tomography

Yu T. Wang, BS; Mongkol Tadarati, MD; Yulia Wolfson, MD; Susan B. Bressler, MD; Neil M. Bressler, MD

IMPORTANCE Diagnosing diabetic macular edema (DME) from monocular fundus photography vs optical coherence tomography (OCT) central subfield thickness (CST) can yield different prevalence rates for DME. Epidemiologic studies and telemedicine screening typically use monocular fundus photography, while treatment of DME uses OCT CST.

OBJECTIVE To compare DME prevalence from monocular fundus photography and OCT.

DESIGN, SETTING, AND PARTICIPANTS Retrospective cross-sectional study of DME grading based on monocular fundus photographs and OCT images obtained from patients with diabetic retinopathy at a single visit between July 1, 2011, and June 30, 2014, at a university-based practice and analyzed between July 30, 2014, and May 29, 2015. Presence of DME, including clinically significant macular edema (CSME), on monocular fundus photographs used definitions from the Multi-Ethnic Study of Atherosclerosis (MESA) and the National Health and Nutrition Examination Survey (NHANES). Presence of DME on OCT used Diabetic Retinopathy Clinical Research Network eligibility criteria thresholds of CST for trials evaluating anti-vascular endothelial growth factor treatments.

MAIN OUTCOMES AND MEASURES Prevalence of DME based on monocular fundus photographs or OCT.

RESULTS A total of 246 eyes of 158 participants (mean [SD] age, 65.0 [11.9] years; 48.7% women; 60.8% white) were included. Among the 246 eyes, the prevalences of DME (61.4%) and CSME (48.5%) based on MESA definitions for monocular fundus photographs were greater than the DME prevalence based on OCT (21.1%) by 40.2% (95% CI, 32.8%-47.7%; P < .001) and 27.2% (95% CI, 19.2%-35.3%; P < .001), respectively. Using NHANES definitions, DME and CSME prevalences from monocular fundus photographs (28.5% and 21.0%, respectively) approximated the DME prevalence from OCT (21.1%). However, among eyes without DME on OCT, 58.2% (95% CI, 51.0%-65.3%) and 18.0% (95% CI, 12.9%-24.2%) were diagnosed as having DME on monocular fundus photographs using MESA and NHANES definitions, respectively, including 47.0% (95% CI, 39.7%-54.5%) and 10.3% (95% CI, 6.3%-15.7%), respectively, with CSME. Among eyes with DME on OCT, 26.9% (95% CI, 15.6%-41.0%) and 32.7% (95% CI, 20.3%-47.1%) were not diagnosed as having either DME or CSME on monocular fundus photographs using MESA and NHANES definitions, respectively.

CONCLUSIONS AND RELEVANCE These data suggest that many eyes diagnosed as having DME or CSME on monocular fundus photographs have no DME based on OCT CST, while many eyes diagnosed as not having DME or CSME on monocular fundus photographs have DME on OCT. While limited to 1 clinical practice, caution is suggested when extrapolating prevalence of eyes that may benefit from anti-vascular endothelial growth factor therapy based on epidemiologic surveys using photographs to diagnose DME.

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Diabetic macular edema (DME) is a common cause of sight-threatening retinopathy among people with diabetes.\textsuperscript{1} Focal/grid photocoagulation or anti-vascular endothelial growth factor (VEGF) therapies reduce the risk of vision loss and increase the chance of vision gain.\textsuperscript{2-8} Therefore, strategies to identify DME among individuals with diabetes are of public health importance and a potential goal of telemedicine screening.

Prior to optical coherence tomography (OCT) use, detection of DME in clinical research studies, including clinically significant macular edema (CSME), often used stereoscopic fundus photographs as defined by the Early Treatment Diabetic Retinopathy Study.\textsuperscript{9} However, grading stereoscopic photographs is labor intensive, is time-consuming, and requires skilled photographers and photograph readers.\textsuperscript{10} Subsequently, many epidemiologic studies and screening programs adopted monocular fundus photography.\textsuperscript{11-14} Without stereopsis, monocular fundus photography studies identified DME and CSME using surrogate markers of thickening, such as lips in the foveal center, macular focal/grid laser scars, or localized color changes in the macula.\textsuperscript{12-15}

Little is known regarding how DME diagnosis based on monocular fundus photographs compares with that based on central subfield thickness (CST) on OCT, even though the latter typically is used to decide whether anti-VEGF therapy should be initiated for DME.\textsuperscript{2,4,6,16} To our knowledge, only 1 study has made such comparison.\textsuperscript{17} In that study, among patients with mild to moderate nonproliferative diabetic retinopathy and maculopathy on monocular fundus photographs, only 38.3% had DME on OCT.\textsuperscript{17} However, the study excluded patients with more severe levels of retinopathy and did not determine whether individuals without DME on monocular fundus photographs had DME on OCT. Furthermore, the study used 250 μm as the CST threshold value for diagnosing DME on spectral-domain OCT (Topcon 3D OCT-1000; Topcon Medical Systems). A 250-μm threshold value for time-domain OCT (Stratus OCT; Carl Zeiss Meditec)\textsuperscript{2,6} used for these Topcon OCT images could lead to an overestimation of central-involved DME. Also, study participants had fundus photographs and OCT images taken on separate visit dates; inconsistencies between imaging modalities could be due to changes in the retina occurring between visits.

To address these limitations, the current study compares diagnoses of DME by monocular fundus photographs vs OCT images obtained at a single visit in patients with diabetic retinopathy to elucidate how DME prevalence reported in epidemiologic studies or telemedicine screening might correspond with DME prevalence using eligibility criteria for clinical trials evaluating anti-VEGF agents for DME.

Grading Monocular Fundus Photographs

Following pupil dilation, color fundus photographs were taken using a 30° digital camera (Zeiss FF4; Carl Zeiss Meditec) in 80.5% or a 60° digital camera (Canon CF-60 DSI; Canon, Inc) in 19.5%. The best-quality monocular fundus photographs centered on the optic nerve and macula were selected for review. Presence of DME and presence of CSME on photographs were determined using definitions from the Multi-Ethnic Study of...

At a Glance
- While monocular fundus photographs often are used in population-based studies and screening programs to identify diabetic macular edema (DME), their relationship to increased central subfield thickness (CST) on optical coherence tomography (OCT) is unknown, prompting this study.
- Using the Multi-Ethnic Study of Atherosclerosis and National Health and Nutrition Examination Survey DME definitions, among eyes with increased CST on OCT, 26.9% (95% CI, 15.6%-41.0%) and 32.7% (95% CI, 20.3%-47.1%), respectively, were not diagnosed as having either DME or clinically significant DME on monocular fundus photographs.
- These data suggest caution when extrapolating prevalence of eyes with increased OCT CST that may benefit from anti-vascular endothelial growth factor therapy for DME based on epidemiologic surveys or screening programs using monocular fundus photographs to diagnose DME.
Atherosclerosis (MESA)\(^{14}\) and the National Health and Nutrition Examination Survey (NHANES),\(^{15,20}\) summarized in Table 1. An Early Treatment Diabetic Retinopathy Study grid calibrated for either 30° or 60° fundus photographs was used by graders determining the presence of each lesion as definitively present, questionably present, or absent based on NHANES grading protocols.\(^{35}\)

### Table 1. Definitions of Diabetic Macular Edema and Clinically Significant Macular Edema on Monocular Fundus Photographs

<table>
<thead>
<tr>
<th>Definition Source</th>
<th>Diabetic Macular Edema</th>
<th>Clinically Significant Macular Edema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Ethnic Study of Atherosclerosis</td>
<td>Hard exudate in the presence of microaneurysms or blot hemorrhages within 1 disc diameter from the center of the macula, or presence of focal photoacoagulation scars in the macular area</td>
<td>Macular edema involving or within 500 μm of the fovea center, or presence of focal photoacoagulation scars in the macular area</td>
</tr>
<tr>
<td>National Health and Nutrition Examination Survey</td>
<td>Rings of organized hard exudate, localized areas of color change, or a deviation of the normal pathway of the retinal blood vessels in the macular area</td>
<td>Edema involving or within 500 μm of the fovea, or presence of ≥1 disc size area of edema with at least a portion of it within the macula</td>
</tr>
</tbody>
</table>

* One disc diameter was defined as 1800 μm, and macular area was defined as the area within a 7.2-mm Early Treatment Diabetic Retinopathy Study grid in both Multi-Ethnic Study of Atherosclerosis and National Health and Nutrition Examination Survey definitions.

#### Grading OCT Images

The OCT images centered on the fovea were obtained with either time-domain OCT (Stratus; Carl Zeiss Meditec) or spectral-domain OCT (Cirrus; Carl Zeiss Meditec; or Spectralis; Heidelberg Engineering) as described in eTable 1 in the Supplement. Graders corrected decentration errors of 250 μm or greater and segmentation errors of 200 μm or greater in length and 100 μm or greater in height within 500 μm of the fovea. Presence of DME on OCT was defined as corrected or confirmed CST values greater than or equal to the threshold values used as eligibility criteria for trials involving central-involved DME in the Diabetic Retinopathy Clinical Research Network (eTable 1 in the Supplement).\(^{21-23}\)

#### Statistical Analysis

Paired t tests were used to compare prevalence of DME or CSME from monocular fundus photographs with OCT. \(P < .05\) was considered statistically significant. Intergrader agreement was calculated using an unweighted \(k\) statistic. Analyses used Stata version 13.1 statistical software (StataCorp LP).

### Results

Between July 1, 2011, and June 30, 2014, 408 patients diagnosed as having diabetic retinopathy were billed for either fundus photography or OCT, resulting in 246 eyes of 158 participants included in the study (Figure). Among enrolled patients, the mean (SD) age was 65.0 (11.9) years, 48.7% were women, and 60.8% were white (Table 2). Visual acuity with habitual correction was 20/40 or worse in 51.6% of the eyes. Diabetic retinopathy severity level (Table 2) was extracted from clinical records; most cases were mild to moderate nonproliferative diabetic retinopathy or proliferative diabetic retinopathy. Applying criteria used for inclusion in Diabetic Retinopathy Clinical Research Network trials evaluating anti-VEGF treatment for DME (Table 2),\(^{23}\) 77.2% of study eyes had no recent treatment; 22.4% had intravitreal anti-VEGF treatment within the last 12 months; and 0.4% had focal/grid laser within the last 4 months. Of 190 eyes with no recent DME treatment, 51.6% had never had any treatment for DME, while 42.1% had received macular laser in the past, 14.2% had received intravitreal anti-VEGF treatment, and 4.2% underwent vitrectomy for complications of diabetic retinopathy.
Intergrader agreement for the presence of macular edema was at least moderate in all categories except for presence of DME using the NHANES definition (eTable 2 in the Supplement). More than half the discrepancies occurred when one grader listed a lesion as being unquestionably present while the other listed it as definitely present or absent on monocular fundus photographs.

Of 246 OCT images, decentration or segmentation errors were corrected in 12 eyes (4.8%), resulting in substantial (>10%) change to the CST in 2 eyes. No corrections of decentration or segmentation errors changed the classification of the eye as having DME or not on OCT.

Table 3 lists the numbers of eyes graded with macular edema on monocular fundus photographs, stratified by presence of DME based on OCT CST. Many eyes had mismatches in diagnoses of DME between monocular fundus photographs and OCT. Discrepancies were greater when applying definitions from MESA vs NHANES. Few eyes were graded as having questionable macular edema on monocular fundus photographs using MESA and NHANES definitions of DME (15 and 4 eyes, respectively) and CSME (20 and 5 eyes, respectively). These eyes, a priori, were grouped with eyes graded as definitely having macular edema. Grouping questionable eyes with eyes graded as having no macular edema did not change the results substantially (eTable 3 and eTable 4 in the Supplement).

Table 4 summarizes the prevalence of macular edema based on monocular fundus photographs vs OCT CST. On monocular fundus photographs using MESA vs NHANES definitions, large differences in the prevalence of DME (61.4% vs 28.5%, respectively) or CSME (48.5% vs 21.0%, respectively) were observed. Recognizing that focal/grid laser scar were included in the MESA definitions of DME and CSME but not in the NHANES definitions, 97 eyes (39.4%) had focal/grid macular laser scars, accounting for much of the discrepancy between macular edema prevalence rates using MESA vs NHANES definitions. Omitting focal/grid scars from the MESA definition resulted in prevalence rates of 35.4% for DME and 9.8% for CSME, appearing more similar to those based on NHANES definitions. The DME prevalence based on OCT CST was 21.1%, varying to 21.3% and 21.0% when 11 and 13 eyes were dropped from the analysis owing to ungradable fundus photographs using MESA and NHANES definitions of CSME, respectively. Compared with the DME prevalence based on OCT CST, monocular fundus photographs overestimated the prevalence of macular edema by 40.2% (95% CI, 32.8%-47.7%; P < .001) and 27.2% (95% CI, 19.2%-35.3%; P < .001) when using MESA definitions of DME and CSME, respectively. In our study, 67.4% of the eyes with lipid within 1 disc diameter of the fovea and 85.6% of the eyes with focal/grid laser scars in the macular area did not have DME based on OCT CST. Among eyes without increased CST on OCT, 58.2% (95% CI, 51.0%-65.3%) and 47.0% (95% CI, 39.7%-54.5%) were diagnosed as having DME and CSME, respectively, on monocular fundus photographs using MESA definitions. Among eyes with increased CST on OCT, 26.9% (95% CI, 15.6%-41.0%) and 46.0% (95% CI, 31.8%-60.7%) were found to have absence of DME and CSME, respectively, on monocular fundus photographs using MESA definitions.

Using NHANES rather than MESA definitions, the prevalences of DME (28.5%) and CSME (21.0%) on monocular fundus photographs more closely approximated the prevalence of DME on OCT (21.1%), for differences of 7.3% (95% CI, 1.6% to 13.0%) and 0% (95% CI, −5.2% to 5.2%), respectively. However, among eyes without DME on OCT, 18.0% (95% CI, 12.9%-24.2%) and 10.3% (95% CI, 6.3%-15.7%) were diagnosed as having DME and CSME on monocular fundus photographs using NHANES definitions. Among eyes with DME on OCT, 32.7% (95% CI, 20.3%-47.1%) and 38.8% (95% CI, 25.2%-53.8%) were found to have absence of DME and CSME, respectively, on monocular fundus photographs using NHANES definitions. No matter which of the MESA or NHANES definitions of DME and CSME were used, more than a quarter of the eyes with central subfield thickening on OCT that were missed by monocular fundus photography had visual acuity of 20/40 or worse.

Table 2. Baseline Characteristics of Enrolled Participants and Eyes

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants (n = 158)</td>
<td></td>
</tr>
<tr>
<td>Sex, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>81 (51.3)</td>
</tr>
<tr>
<td>Women</td>
<td>77 (48.7)</td>
</tr>
<tr>
<td>Race, No. (%)</td>
<td></td>
</tr>
<tr>
<td>White or Caucasian</td>
<td>96 (60.8)</td>
</tr>
<tr>
<td>Black or African American</td>
<td>38 (24.1)</td>
</tr>
<tr>
<td>Asian</td>
<td>4 (2.5)</td>
</tr>
<tr>
<td>Other</td>
<td>18 (11.4)</td>
</tr>
<tr>
<td>Unknown</td>
<td>2 (1.3)</td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>65.0 (11.9)</td>
</tr>
<tr>
<td>Enrolled eyes (n = 246)</td>
<td></td>
</tr>
<tr>
<td>Visual acuity with habitual correction</td>
<td></td>
</tr>
<tr>
<td>20/32 or better, No. (%)</td>
<td>119 (48.4)</td>
</tr>
<tr>
<td>20/40 or worse, No. (%)</td>
<td>127 (51.6)</td>
</tr>
<tr>
<td>Median (interquartile range)</td>
<td>20/40 (20/25-20/50)</td>
</tr>
<tr>
<td>Lens status, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Phakic</td>
<td>142 (57.7)</td>
</tr>
<tr>
<td>Pseudophakic</td>
<td>102 (41.5)</td>
</tr>
<tr>
<td>Unknown</td>
<td>2 (0.8)</td>
</tr>
<tr>
<td>Diabetic retinopathy severity level</td>
<td></td>
</tr>
<tr>
<td>No DR</td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Mild to moderate/severe NPDR</td>
<td>101 (41.1)</td>
</tr>
<tr>
<td>Severe NPDR</td>
<td>37 (15.0)</td>
</tr>
<tr>
<td>PDR</td>
<td>107 (43.5)</td>
</tr>
<tr>
<td>Recent treatment for DME, No. (%)*</td>
<td></td>
</tr>
<tr>
<td>No recent treatment</td>
<td>190 (77.2)</td>
</tr>
<tr>
<td>Intravitreal anti-VEGF in past 12 mo</td>
<td>55 (22.4)</td>
</tr>
<tr>
<td>Focal/grid laser in past 4 mo</td>
<td>1 (0.4)</td>
</tr>
</tbody>
</table>

Abbreviations: DME, diabetic macular edema; DR, diabetic retinopathy; NPDR, nonproliferative diabetic retinopathy; PDR, proliferative diabetic retinopathy; VEGF, vascular endothelial growth factor.

* Includes eyes listed as having mild NPDR, mild to moderate NPDR, moderate NPDR, and moderate to severe NPDR in clinical records.

Recent treatment was defined as intravitreal anti-VEGF injections in the past 12 months, focal/grid laser in the past 4 months, intravitreal or periocular corticosteroid injections in the past 4 months, or vitrectomy in the past 4 months.
Subgroup analysis of the 190 eyes that had not received recent treatment for DME revealed results very similar to the findings of the entire cohort (eTable 5 in the Supplement). Higher proportions of eyes with DME on OCT by increased CST were missed by monocular fundus photographs in the subgroup of eyes without recent treatment compared with the entire cohort, regardless of whether the MESA definitions of DME (35.7% vs 26.9%) or CSME (53.8% vs 46.0%) or NHANES definitions of DME (46.4% vs 32.7%) or CSME (52.0% vs 38.8%) were used.

### Discussion

This study suggests that monocular fundus photography grading for DME using MESA or NHANES definitions can overestimate the prevalence of DME compared with a definition based on increased CST on OCT. This observation parallels a previous study in which only 38.3% of the patients who had evidence of diabetic maculopathy on monocular fundus photographs were confirmed to have macular edema on OCT.17 In MESA, eyes with lipid and microaneurysms within 1 disc diameter of the fovea and eyes with focal/grid laser scars in the macula were diagnosed as having DME. However, in our study, 67.4% of the eyes with lipid within 1 disc diameter of the fovea and 85.6% of the eyes with focal/grid laser scars in the macular area did not have DME based on OCT CST.

Prevalence rates of DME and CSME based on NHANES definitions rather than MESA definitions were closer to DME prevalence based on OCT CST. Exclusion of focal/grid laser scars as part of the definition of DME and CSME in NHANES led to a prevalence of DME closer to that based on OCT CST. However, 10.3% of eyes in which DME was absent on OCT still were diagnosed as having CSME using NHANES definitions, while 32.7% of eyes with DME on OCT CST were not diagnosed as having DME using NHANES definitions. These findings suggest caution when extrapolating prevalence of eyes that may benefit from anti-VEGF therapy for DME based on epidemiologic data or screening programs using monocular fundus photographs to define DME. While the overall prevalence of CSME based on the NHANES definition was similar to the preva-
lence of DME based on OCT in this cohort, the large number of mismatches between the 2 imaging modalities still suggests caution when extrapolating the prevalence of CSME on monocular fundus photographs to the prevalence of DME based on OCT CST.

Results of this study suggest that monocular fundus photographs alone may not be an adequate telemedicine screening strategy for DME, particularly for eyes in which treatment might be considered. The MESA and NHANES definitions did not diagnose DME in 26.9% and 32.7%, respectively, of the eyes with DME based on OCT CST. Of the eyes with DME based on OCT CST that were missed by monocular fundus photographs, more than a quarter of the eyes had visual acuity of 20/40 or worse. Thus, some of these eyes may have been appropriate candidates for anti-VEGF therapy for DME. This proportion increases further if one considers treatment for even lesser levels of vision impairment, such as visual acuity of 20/32.

While adequate sensitivity and specificity have been found comparing monocular fundus photographs with stereoscopic fundus photographs for detecting CSME, OCT is an even more sensitive diagnostic test for early detection of macular thickening. As OCT is now used as a standard imaging tool in clinical trials and by many clinicians for detecting DME and guiding management, this study provides the magnitude of added value that OCT might bring to epidemiologic studies or telemedicine screening strategies to optimize DME detection. In addition to detecting DME in many eyes that were missed by monocular fundus photographs, fewer eyes had ungradable OCT images (15 eyes) than ungradable monocular fundus photographs (48 eyes), potentially allowing determination of DME status in some eyes in which high-quality fundus photographs cannot be obtained. Furthermore, very few OCT images needed manual correction of decentration or segmentation errors, and no corrections changed the CST enough to change conclusions regarding presence of DME based on OCT CST. Finally, interpretation of monocular fundus photographs is highly subjective, as reflected by the limited intergrader κ values in this study, especially when using NHANES definitions of DME.

One limitation of this study is its retrospective design performed in 1 retina clinic, so that generalizability of the results may be limited. As compared with populations seen in epidemiologic or screening studies, this cohort likely has a higher proportion of patients who have recently received treatment for DME, which might contribute to discrepancies in diagnoses of DME between monocular fundus photographs and OCT CST. Of note, subgroup analysis of the 77.2% of eyes that had not received recent treatment revealed results very similar to findings of the entire analysis cohort. Another limitation was that monocular fundus photographs and OCT CST of each eye were reviewed by the same graders. However, the volume of eyes that graders had to review on one imaging modality and the time separation graders had before reviewing eyes on a second imaging modality limited the chance that graders unconsciously remembered findings from fundus photographs before grading OCTs, and vice versa. Additionally, resource constraints did not allow for review of all fundus photographs by multiple graders. The subjectivity of monocular fundus photographs was reflected by the limited intergrader κ values in this study. Whether having multiple graders of monocular fundus photographs would have decreased the inconsistencies found between diagnoses based on fundus photographs and OCT images is unknown. Lastly, this study used monocular fundus photographs taken after pupillary dilation, primarily with 30° cameras, whereas NHANES and MESA used images taken with a nonmydriatic 45° camera. The photographic methods used in this study may have led to better-quality images than those obtained in NHANES and MESA, but the potential effect of using 45° or primarily 60° fundus photographs on the results of this study is unknown.

The prevalence of DME in epidemiologic studies is usually reported among persons rather than among eyes. In this study, we reported prevalence of DME by eyes because the study objective was to evaluate the method of epidemiologic studies that use monocular fundus photographs to detect DME, and this purpose seemed best achieved by comparing diagnosis of DME based on monocular fundus photographs vs OCT CST among individual eyes. Reporting DME prevalence among persons would mask instances in which both monocular fundus photographs and OCT lead to a person being identified as harboring DME when the 2 methods yielded discrepant conclusions in each eye of the person. Some of the study’s strengths included acquisition of monocular fundus photographs and OCT images on the same day for each eye, inclusion of eyes with a wide range of diabetic retinopathy severity levels, grading of monocular fundus photographs following MESA and NHANES protocols, and correction of decentration and segmentation errors on OCT images.

Conclusions
Our results suggest that the prevalence of eyes with DME and CSME reported in epidemiologic studies or screening programs that use monocular fundus photographs may be much greater than the prevalence of eyes with DME based on increased CST on OCT. Caution seems warranted when extrapolating prevalence of eyes that may benefit from anti-VEGF therapy for DME based on epidemiologic data using monocular fundus photographs without OCT to define DME, especially when initiation of treatment typically is based, in part, on OCT CST. Also, many eyes were diagnosed as having DME and CSME on monocular fundus photographs when there was no increased CST on OCT, while other eyes were found to have no DME or CSME on monocular fundus photographs when there was increased CST on OCT. These findings suggest the magnitude of inadequacy of monocular fundus photography, without OCT, as a strategy for identifying DME in population-based studies or when screening for DME.
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Drafting of the manuscript: Wang, S. B. Bressler.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Wang.

Obtained funding: N. M. Bressler.

Administrative, technical, or material support: Tadarat, N. M. Bressler.

Study supervision: Tadarat, S. B. Bressler, N. M. Bressler.

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REFERENCES


