Binocular Visual Acuity Summation and Inhibition in an Ocular Epidemiological Study: The Los Angeles Latino Eye Study

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PURPOSE. To characterize binocular visual acuity summation and inhibition in participants of a population-based ocular epidemiologic study.

METHODS. A complete ophthalmologic examination of Latinos, aged 40 or more years, measured binocular and monocular distance visual acuities by a standard early-treatment diabetic retinopathy study (ETDRS) protocol. The proportions of participants who demonstrated binocular summation (i.e., binocular visual acuity was better than the better eye visual acuity by five or more letters), binocular inhibition (i.e., binocular visual acuity was worse than the better eye visual acuity by five or more letters), and visual impairment (visual acuity worse than 20/40) were calculated.

RESULTS. In 1831 individuals, on average, binocular visual acuity was better than better eye visual acuity. Prevalence rates of binocular summation and inhibition were 21% and 2%, respectively. Compared with participants less than 65 years old or those with equivalent interocular visual acuity, older participants (≥65 years) and those with interocular differences in visual acuity were more likely to demonstrate binocular inhibition (P < 0.01). The rate of visual impairment was significantly lower, when using binocular visual acuity than when using better eye or the American Medical Association (AMA) algorithm (5.2% vs. 6.9% and 9.5%, respectively P < 0.01). Participants with binocular inhibition had greater self-reported problems with driving activities (P < 0.05).

CONCLUSIONS. The large proportion of individuals demonstrating binocular summation and inhibition suggests that in clinical or research settings, binocular visual acuity should be considered a primary measure of visual impairment, because it better equates the state in which the person usually functions. (Invest Ophthalmol Vis Sci. 2002;43:1742–1748)

Numerous studies have demonstrated that vision with two eyes differs from vision with one eye, in visual acuity, contrast sensitivity, and peripheral visual field.1–5 However, most of these studies were laboratory based and were performed in a small number of participants. Although there have been a handful of population-based ocular epidemiologic studies,6–8 few have evaluated the advantage or disadvantage of binocularity over monocular vision.

The Los Angeles Latino Eye Study (LALES) is a population-based prevalence survey of ocular disease in Latinos, aged 40 years and older in the City of La Puente in Los Angeles County, California. As part of the screening process in LALES, both binocular and monocular distance visual acuities are measured. The objectives of this study were to estimate the prevalence rates of binocular summation (i.e., binocular visual acuity better than better eye visual acuity) and binocular inhibition (i.e., binocular visual acuity worse than better eye visual acuity); to develop and evaluate models for predicting binocular summation and inhibition from monocular visual acuity; to explore the associations of age, gender, and the difference in interocular visual acuity with binocular summation and inhibition; to estimate the prevalence rates of visual impairment on the basis of binocular and better eye visual acuities, as well as the American Medical Association (AMA) algorithm for visual impairment; and to evaluate the relationship between various measures of visual acuity and vision-specific, health-related quality of life.

MATERIALS AND METHODS

Study Cohort

The study cohort consisted of all self-identified Latinos, aged 40 years or older living in two census tracts in the City of La Puente, California. The study protocol was approved by the Institutional Review Board at the University of Southern California. All study procedures adhered to the Declaration of Helsinki for research involving human subjects. After informed consent was obtained, an in-home interview was conducted to determine demographic factors and information regarding ocular and medical conditions, risk factors, and access to medical and ocular care. A subsequent detailed eye examination, including visual acuity testing, was performed in a standardized manner at the LALES Local Eye Examination Center. Vision-related quality of life was assessed by the 25-item National Eye Institute-Vision Function Questionnaire (NEI-VFQ-25).9

Visual Acuity Testing

The distance visual acuity of each LALES participant was measured in each eye with the current correction (if any) at 4 m, by the Lighthouse Early-Treatment Diabetic Retinopathy Study (ETDRS) distance charts transilluminated with the Lighthouse Chart illuminator (Lighthouse International, New York, NY). Distance visual acuity was measured binocularly, then monocularly (right eye followed by left eye) with the participant’s existing refractive correction. A different chart was used for each of the binocular, right eye, and left eye tests. If the participant read fewer than 20 letters at 4 m, visual acuity was measured at 1 m. If the participant was unable to read the largest letters at a distance of 1 m, a semiquantitative estimate of visual acuity (counting fingers,
Binocular Summation and Inhibition

In addition, the prevalence of visual impairment (defined to be worse than 20/40) was calculated using binocular visual acuity, better eye visual acuity, and the AMA algorithm for visual impairment. This definition of visual impairment is based on the U.S. Federal Motor Carrier Safety Regulations that requires a corrected or uncorrected visual acuity of 20/40 or better. The AMA algorithm for impairment of the visual system is ($3 \times$ better eye value + worse eye value)/4. Rates of concordance and discordance between the three criteria were compared by $\chi^2$ procedures.

Analyses of covariance (ANCOVA) were conducted to compare the NEI-VFQ-25 scores for distance activities, near vision activities, and driving difficulties in participants with summation, inhibition, and equivalent visual acuity. These analyses were adjusted for age, gender, and comorbidity (e.g., cancer, cardiovascular disease, diabetes). When significant differences were found, pair-wise comparisons used the Tukey multiple comparison procedure. Finally, separate multiple linear regression analyses were used to determine the association of visual acuity (binocular, better eye, and the AMA measure) with difficulties in distance activities, near vision activities, and driving, by using scores from the NEI-VFQ-25. For these analyses, both the NEI-VFQ-25 subscales and visual acuity were log transformed to impose normality. All analyses were conducted at the 0.05 significance level, on computer (SAS, Cary, NC).

RESULTS

Description of Study Cohort

Complete data on binocular and better eye visual acuities were available for 1831 of the 1876 (98%) participants. Ten participants with visual acuity measured in one eye and 35 participants with no light perception in either eye were excluded.) The average ($\pm$SD) age was 55.1 ± 11.1 years (range, 40–95). Of the participants, 1433 (78%) were less than 65 years of age, 398 (22%) were 65 years of age or more, and 1070 (58%) were women. The number of subjects with at least one comorbid condition (e.g., cancer, heart disease, diabetes) was 1333 (73%).

Table 1 summarizes the ocular characteristics for the study cohort. Shown in the table are the median and range for binocular, better eye, and AMA visual acuities (expressed as logMAR and Snellen notation). On a population basis, binocular visual acuity was better than the better eye visual acuity by an average (median) of 0.02 logMAR units (one letter on the ETDRS chart).

Also presented in the table are summary statistics for the interocular differences in visual acuity, overall and stratified by age. Overall, the median interocular difference was 0.06 logMAR units (three letters). Compared with participants aged less than 65 years, participants aged 65 years or more had greater differences in interocular visual acuity (three letters vs. five letters, $P < 0.0001$). Table 1 also summarizes the correlations between binocular, better eye visual acuities, and the AMA measure (expressed as logMAR). In terms of goodness-of-fit (as measured by the squared correlation coefficient), the AMA measure and better eye visual acuity explained 85% and 86% of the variability in binocular visual acuity, respectively, whereas worse eye explained only 52% of the variability (all $P < 0.0001$).

Prevalence of Binocular Summation and Inhibition

Figure 1 presents the prevalence rates (along with the upper and lower 95% confidence limits) of binocular summation and inhibition. Using the logMAR lines criterion, binocular summation was noted in 391 (21%) of the 1831 participants and binocular inhibition in 29 (2%) of the participants. The remaining 1411 (77%) had equivalent binocular and better eye visual acuities. When binocular and better eye visual acuity differed,
participants were 10 times more likely to exhibit binocular summation than binocular inhibition ($P < 0.0001$, by goodness-of-fit test).

No significant difference in the proportion of participants who used glasses or contact lenses was found within each visual acuity category ($P = 0.21$). For the participants with equivalent binocular and better eye visual acuity, 46% wore glasses or contact lenses and 54% did not. For participants demonstrating summation or inhibition, the rates were 41% versus 58% and 2% versus 1%, respectively.

**Prediction of Binocular Summation and Inhibition by Monocular Visual Acuity**

For the first model (linear regression model), binocular visual acuity was estimated from the linear regression equation relating the logMAR binocular visual acuity (dependent variable) to the logMAR better eye visual acuity and the interocular difference (better eye — worse eye) in visual acuities (independent variables). The multiple correlation coefficient between the dependent and the two independent variables was large and statistically significant (0.94, $P < 0.0001$), indicating that 88% of the variability in binocular visual acuity was explained by the linear regression equation. However, when the associated linear regression equation was used to predict whether a participant exhibited binocular equivalency, summation, or inhibition (using the logMAR lines criterion), only 1424 (78%) of the participants were correctly classified (Fig. 2). Of the 1411 participants with equivalent better eye and binocular visual acuity, 1385 (98%) were correctly classified. Of the 420 participants who exhibited nonequivalence (i.e., binocular summation or inhibition), only 39 (9%) were correctly classified.

Similar results were found when the associated logistic regression equation was used to predict whether a participant exhibited binocular equivalency or nonequivalence (Fig. 2). Overall, 77% of the participants were correctly classified. Of the 1411 participants with equivalent better eye and binocular visual acuity, 1376 (98%) were correctly classified. Of the 420 participants with nonequivalent visual acuity, only 42 (10%) were correctly classified.

**TABLE 1. Ocular Characteristics of Study Participants**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Summary Statistics (logMAR)</th>
<th>Summary Statistics (Snellen Notation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binocular</td>
<td>−0.06 (−0.30, 1.44)*</td>
<td>20/20†</td>
</tr>
<tr>
<td>Better Eye</td>
<td>0.00 (−0.30, 1.40)</td>
<td>20/20</td>
</tr>
<tr>
<td>AMA</td>
<td>0.00 (−0.28, 1.42)</td>
<td>20/20</td>
</tr>
<tr>
<td>Better Eye — Binocular Interocular Difference</td>
<td>0.02 (−0.30, 0.40)</td>
<td>1 letter</td>
</tr>
<tr>
<td>Overall</td>
<td>0.06 (0.00, 1.70)</td>
<td>3 letters</td>
</tr>
<tr>
<td>Age &lt; 65 years</td>
<td>0.06 (0.00, 1.74)</td>
<td>3 letters</td>
</tr>
<tr>
<td>Age ≥ 65 years</td>
<td>0.10 (0.00, 1.38)</td>
<td>5 letters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlational Relationships (logMAR)</th>
<th>Pearson Correlation</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binocular and better eye</td>
<td>0.93</td>
<td>&lt;0.00001</td>
</tr>
<tr>
<td>Binocular and worse eye</td>
<td>0.72</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Binocular and AMA</td>
<td>0.92</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

$n = 1831$.

* Median (minimum, maximum).
† Median.

**FIGURE 1.** Prevalence rates (expressed as percentages with 95% confidence intervals) of participants with binocular equivalency, summation, and inhibition for the logMAR lines criterion.

**FIGURE 2.** Predictive ability of linear regression and logistic regression models in identifying participants exhibiting equivalent versus nonequivalent (i.e., summation or inhibition) visual acuity. The vertical axis represents the percentage of participants correctly classified by each of the regression models compared with classifications using the logMAR lines criterion (Fig. 1). Percentage of participants correctly classified are shown for all participants, for those with equivalent binocular and better eye visual acuities, and for those with nonequivalent binocular and better eye visual acuities.
Factors Related to Summation and Inhibition

Table 2 presents the distribution of the difference in (better eye – binocular) visual acuity (defined by logMAR lines) stratified by age (<65 years vs. ≥65 years). Overall, there was a significant relationship between age and differences in binocular and better eye visual acuities (P < 0.0001). Compared with participants younger than 65 years, participants 65 years of age or older were more likely to demonstrate binocular summation or inhibition (P < 0.0001). No gender-related differences for binocular summation or inhibition were present (P = 0.86; data not shown). No comorbidity-related differences for binocular summation or inhibition were present (P = 0.70; data not shown).

Table 2 also presents the distribution of the difference in (better eye – binocular) visual acuity (defined by logMAR lines) stratified by the difference in visual acuities for the left and right eyes. The proportion of participants with different interocular visual acuities (by one or more lines) was significantly greater in participants demonstrating summation compared with participants demonstrating summation (24/29 [83%) versus 99/391 [25%] participants; P < 0.0001).

Prevalence of Visual Impairment

As shown in Figure 3, the prevalence rates of visual impairment based on binocular and better eye visual acuities and the AMA measure were 5.2%, 6.9%, and 9.5%, respectively. The impairment rate found by using binocular acuity was significantly lower than the impairment rates found by using better eye visual acuity and the AMA measure (P < 0.0001, McNemar χ² test).

We compared the rates of concordance for the presence of visual impairment as determined by binocular visual acuity, better eye visual acuity, and the AMA measure. The classification of visual impairment was equivalent when using binocular and better eye visual acuity in 1782 (97%) of the participants. The classification of visual impairment was equivalent when using binocular acuity and the AMA measure in 1747 (95%) of the participants. The classification of visual impairment was equivalent, when using better eye and the AMA measure in 1784 (97%) of the participants.

Of the 95 participants with visual impairment, as determined by binocular visual acuity, 65.3% had equivalent binocular versus better eye visual acuity, whereas 28.4% demonstrated summation and 6.3% demonstrated inhibition. These prevalence rates were significantly different from those for the 1736 participants without visual acuity (77.7% vs. 21.0% vs. 1.3%, P < 0.0001). Similar results were obtained using the better eye and the AMA measure for determining visual impairment.

Relationship with Vision-Specific Quality of Life

Table 3 presents summary statistics (unadjusted and covariate-adjusted means) for the NEI-VFQ-25 distance and near vision activities, and driving difficulties stratified by the three (better eye – binocular) visual acuity subgroups. Although inhibitors had lower scores on distance and near vision activities than those with binocular summation and equivalence, no statistically significant differences were found across the three subgroups (P = 0.25, P = 0.19, respectively). In contrast, there

![Figure 3](http://iovs.arvojournals.org/pdfaccess.ashx?url=/data/journals/iovs/932913/ on 03/30/2017)
was a significant difference in driving difficulties across the three groups (P = 0.03). Participants exhibiting inhibition had significantly lower scores than those exhibiting binocular equivalence or binocular summation (P < 0.05, Tukey multiple comparison procedure). The observed difference in covariate-adjusted means of 9.7 quality-of-life units for driving difficulties surpassed the clinically relevant cutoff of 5 quality-of-life units, suggesting an increase in driving difficulties in individuals who demonstrate binocular inhibition.

Table 4 presents, for all participants and for participants exhibiting binocular summation or inhibition, the results of the correlational analyses of the NEI-VFQ-25 subscales with binocular and better eye visual acuities and the AMA measure. For all participants, the covariates (age, gender, comorbidity) explained between 4% and 7% of the variation in the three NEI-VFQ-25 subscales. Inclusion of visual acuity along with the covariates explained between 11% and 22% of the variation in these three NEI-VFQ-25 subscales. For the complete cohort, for all three subscales (distance vision activities, near vision activities, and driving difficulties), the correlation was slightly higher with either binocular acuity or the AMA measure than it was with better eye acuity. Similar relationships were found in the subgroup of participants exhibiting summation or inhibition (Table 4).

**DISCUSSION**

Visual acuity is an important predictor of visual function and is used clinically to assess visual impairment. This assessment of visual impairment has important practical considerations, including obtaining a license to drive a motor vehicle, determination of eligibility for disability benefits, and an assessment of need for cataract extraction. Thus, it is critical to obtain an accurate assessment of an individual’s visual acuity.

### Table 3. NEI VFQ-25 Scores for Distance and Near Activities and Driving Difficulties

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Equivalent (n = 1,411)</th>
<th>Summation (n = 391)</th>
<th>Inhibition (n = 29)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance vision activities</td>
<td>86.1 ± 18.8 (85.0)</td>
<td>85.4 ± 18.3 (84.2)</td>
<td>78.3 ± 18.6 (79.8)</td>
<td>0.25</td>
</tr>
<tr>
<td>Near vision activities</td>
<td>79.4 ± 21.1 (79.4)</td>
<td>81.1 ± 20.2 (81.1)</td>
<td>73.7 ± 16.9 (75.4)</td>
<td>0.19</td>
</tr>
<tr>
<td>Driving difficulties</td>
<td>88.4 ± 16.6 (85.8)</td>
<td>87.6 ± 16.6* (85.8)</td>
<td>76.2 ± 24.7* (76.1)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Data are stratified by differences in binocular and better eye visual acuity and are expressed as the mean ± SD, with covariate-adjusted mean (least-squares mean) in parentheses.

### Table 4. Correlation of Binocular and Better Eye Visual Acuity with the NEI-VFQ-25 Subscales

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Distance Vision</th>
<th>Near Vision</th>
<th>Driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Participants</td>
<td>0.27</td>
<td>0.19</td>
<td>0.23</td>
</tr>
<tr>
<td>Covariates</td>
<td>0.47</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>Covariates + binocular acuity</td>
<td>0.44</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Covariates + better eye acuity</td>
<td>0.44</td>
<td>0.32</td>
<td>0.33</td>
</tr>
<tr>
<td>Covariates + AMA acuity</td>
<td>0.22</td>
<td>0.16</td>
<td>0.23</td>
</tr>
<tr>
<td>Summation/Inhibition Participants</td>
<td>0.35</td>
<td>0.27</td>
<td>0.38</td>
</tr>
<tr>
<td>Covariates + binocular acuity</td>
<td>0.35</td>
<td>0.26</td>
<td>0.32</td>
</tr>
<tr>
<td>Covariates + better eye acuity</td>
<td>0.37</td>
<td>0.28</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Although binocular visual acuity appears to be the most intuitively appropriate measure of a person’s vision (because the person functions with both eyes open), in the clinical and research environment, monocular visual acuity has been measured routinely, and different criteria have been used to measure visual impairment. These criteria include the Committee on Medical Rating of Physical Impairment of the AMA, in which Impairment of the Visual System equals (three × better eye value + worse eye value)/4. Although the better and worse eye values are designed to incorporate ocular motility, peripheral visual fields, and distance and near visual acuity, logMAR distance visual acuity scores are typically used. A more recent measure used by the U.S. Social Security Administration to determine disability is visual acuity in the better seeing eye, as a measure of binocular function. A third measure of impairment used by the U.S. Federal Highway Safety Administration and various state departments of motor vehicles is binocular visual acuity and monocular visual acuity in both eyes, as the vision standard for obtaining a driver’s license. Although these measures use either monocular visual acuity or a combination of monocular and binocular visual acuity, they do not take into account the phenomenon of binocular summation and inhibition.

Numerous studies have demonstrated that under certain conditions, binocular visual acuity is superior to better eye monocular visual acuity. These clinical experiments have provided convincing evidence that binocular summation occurs in individuals who have similar visual acuities in the two eyes and occurs at low illuminance levels. In addition, these studies have demonstrated that binocular gain or summation is less likely when the visual acuities in the two eyes are dissimilar or when the individual is older. Indeed, these individuals with dissimilar acuities in the two eyes may exhibit binocular inhibition. At least two physiologic explanations have been hypothesized for binocular summation, including the probability that two eyes have a greater chance for detection than one eye and that two eyes provide for threshold contrast summation that is not attainable under monocular conditions.

Although these studies provide the underpinnings for the phenomenon of binocular summation they were conducted in a small number of participants in a clinic-based environment. A recent epidemiologic study of 2520 participants from Salisbury, Maryland, aged 65 to 84 years showed that the binocular acuity could be inferred from a measure of monocular acuity—namely, better eye visual acuity. In addition, the investigators did not find any significant evidence for binocular summation. Also, in individuals with dissimilar monocular acuities in the two eyes, no evidence of binocular inhibition was noted.

Although our data agree with those of the Salisbury Eye Evaluation, in that binocular visual acuity correlated highly with visual acuity in the better-seeing eye, we found substantial evidence of binocular summation and inhibition. We think that
this has clinical importance, because individuals perform their daily activities by using both eyes. Therefore, functional assessment of visual performance should evaluate visual function when both eyes are open.

One explanation for the difference between the Salisbury data and our data may be that in the Salisbury study best corrected visual acuity was used, whereas in our study visual acuity in the initial examination was used. We believe that this is important, because most individuals do not always have the best corrected visual acuity. Thus, if individuals' vision is not best corrected, there is a greater likelihood that better eye visual acuity is not really the true (binocular) visual acuity. If individuals seek disability determination without ensuring they have the best correction, the better eye visual acuity is likely to lead to an inflated number of disability determinations. In addition, these data on the prevalence of binocular summation and inhibition substantiate the results of other clinical studies.1–6 We found that binocular summation was more likely to be present when the two eyes are equivalent, whereas binocular inhibition occurred more often when the two eyes were dissimilar.

Our results show that binocular distance visual acuity measurement provides a better visual acuity measurement (binocular summation) for more than 10 times as many individuals (21%), as does better eye distance visual acuity measurement (binocular inhibition; 2%). Although we can fairly accurately predict binocular visual acuity from better eye visual acuity (as suggested by the large and significant correlation coefficient, Table 1), we cannot predict whether an individual exhibits binocular summation or inhibition, using either linear or logistic regression procedures (Fig. 2). Because a person uses both eyes to perform daily activities, and because of the high prevalence rates of binocular summation and inhibition, binocular visual acuity is the most accurate measure.

Our data on the relationship of age with binocular summation and inhibition are also similar to findings in previous studies that fewer older individuals than younger individuals exhibit contrast and luminance summation.5,6 We also found that binocular summation was less likely in older individuals than in younger individuals. An explanation for this observation is that younger individuals are less likely to have dissimilar vision due to cataract or other ocular diseases compared with older individuals.

Previous studies of patients with cataract and dissimilar vision in the two eyes have demonstrated binocular inhibition.5,4 It has been hypothesized that dissimilar vision in the two eyes increases visual glare and thus gives rise to binocular inhibition. Although we found evidence for binocular inhibition, the extent of binocular inhibition did not increase with increasing dissimilarity in the vision of the two eyes.

There are potentially three limitations to our study. First, the sample that we studied could be selected and unique in a way that would exaggerate the prevalence of binocular summation and inhibition. In our study, we obtained a population-based sample of Latinos who are comparable in age, gender, and socioeconomic status to Latinos in the United States. Thus, we have no reason to believe that our sample was selected. Second, we did not perform repeat testing in every subject to determine the reproducibility of binocular summation and inhibition. In a population-based study, it is difficult and not practically feasible to perform multiple repeat testing on each subject, because it would prolong the examination and potentially adversely affect participation rates in the study. Also, if our findings were due to measurement error, then the rates of inhibition and summation should be similar and unrelated to interocular differences and age. In our study, we found that binocular summation was more than 10 times more prevalent than binocular inhibition. Third, although we obtained information on self-reported visual function, it would be more informative to obtain more detailed data on the effect that binocular summation and inhibition have on activities of daily living. Also, it would be more useful to determine whether the presence of ocular diseases, such as macular degeneration, cataract, and glaucoma, has an impact on binocular summation and inhibition and thereby an impact on daily activities. These questions deserve further study. Overall, however, we believe that the results of this study provide an accurate measure of the prevalence of binocular summation and inhibition in a population-based sample of Latinos.

Finally, if we assume that a gold standard for binocular visual function is binocular visual acuity, then classifying individuals as having visual impairment by using either better eye visual acuity or the AMA definition of visual impairment with refraction at initial examination will classify a significantly larger group of individuals as having visual impairment. In our study, between 61 and 108 of the participants were misclassified. If these data are reflective of the U.S. Latino population aged 40 years and older (approximately 10,009,157) then between 170,156 and 430,394 people could be misclassified. Because there is no biological reason to believe that this phenomenon would be limited to Latinos, then of the individuals in the United States aged 40 years and older (approximately 119,970,137), between 2,039,493 and 5,158,716 individuals may be misclassified.

This large discrepancy between the number of individuals with visual impairment based on different criteria should be studied more carefully. Our recommendation based on the data from this study is that various governmental agencies should consider using binocular visual acuity with current refractive correction as the measure of visual function, because it most closely relates to the natural state of the individual and accounts for binocular summation and inhibition. This is especially important for agencies that license drivers, because individuals who demonstrated binocular inhibition were more likely to have driving difficulties. Thus, because a substantial number of individuals exhibit binocular summation and inhibition, and because individuals exhibiting binocular summation and inhibition differ substantially in visual function, binocular visual acuity at initial examination provides a measure that more closely relates to visual function (as measured by the NEI-VFQ-25) compared with other measures. Thus, in research settings, in clinical practice, and when determining visual impairment, binocular visual acuity should be measured, because it is the state in which individuals performs their daily activities.

**APPENDIX**

**The Los Angeles Latino Eye Study Group**


**References**


