receiving a second IVB injection with time. The reason for repeated injections was most likely recurrent or persistent NVI and/or neovascularization of anterior chamber angle. In real world clinical experience, repeated injections translate into a higher risk of vision loss from NVG, because, while IVB inhibits human vascular endothelial growth factor (VEGF) temporarily, induces initial regression of neovascularization, and possibly decreases further neovessel formation and progressive angle closure, it does not, however, constitute a long-term solution for the underlying driving force behind NVG—ischemia. PRP is the only modality that definitively reduces or eliminates retinal ischemia, allowing for long-lasting control of the disease. In addition, despite the IVB-induced regression of NVI, vascular ghost vessels remain after regression of vessels visible on slit lamp or gonioscopy. These ghost vessel bodies close off areas of the trabecular meshwork and if recurrent over many times after repeated IVB injections, will eventually lead to progressive NVG and chronic angle closure by these ghost vessels in the angle.

We feel that more definitive treatment with prompt PRP and IVB *vs* repeated administration of IVB with close observation entails fewer patient visits, fewer complications associated with intravitreal injections (namely, endophthalmitis and retinal detachment, and albeit rare), and lower long-term cost to the patient. In addition, we prefer to treat the underlying cause and not treat only the consequences.

We suggested that patients with NVG can benefit from the early-onset antiangiogenic action of IVB and the long-lasting effect of PRP, particularly in patients with vitreous hemorrhage, where the administration of IVB can induce regression of the neovessels and hasten resolution of bleeding, allowing prompt PRP to be carried out. Furthermore, IVB administration may decrease the risk of intra- and postoperative bleeding in subsequent glaucoma drainage implant surgery, and may exert an anti-inflammatory activity with decreased vascular permeability (VEGF was originally identified as vascular permeability factor). We therefore recommend IVB administration to be part of the standard therapeutic regimen for NVG, but for clinicians to also recognize the importance of addressing retinal ischemia (the root cause of NVG) by timely and promptly performing PRP on NVG patients, when clinically feasible.

### Conflict of interest

The authors declare no conflict of interest.

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**Sir,**
**Comment on: 'Effectiveness of a smartphone application for testing near-visual acuity'**

I read with interest the article Effectiveness of a smartphone application for testing near visual acuity.[1] Even though the results are interesting, I have a few concerns and comments. An analysis of the iPhone 5 limitations on displaying the optotype detail is required for discussing the results. If we consider the detail as the pixel size (PS), we can obtain the finest visual acuity ($VA_{lim}$) that a smartphone can display by the next equation,

$$VA = \frac{1}{\alpha'}; \alpha' = 60 \times \arctan\left(\frac{a}{d}\right); a = \frac{25.4}{DPI}; VA_{lim} = \frac{1}{60 \times \arctan\left(\frac{25.4}{DPI \cdot d}\right)}$$

where DPI is the dots per inch of the device, $a$ is the PS, and $d$ is the presentation distance (mm). Furthermore, PS does not only determines the $VA_{lim}$ but also the

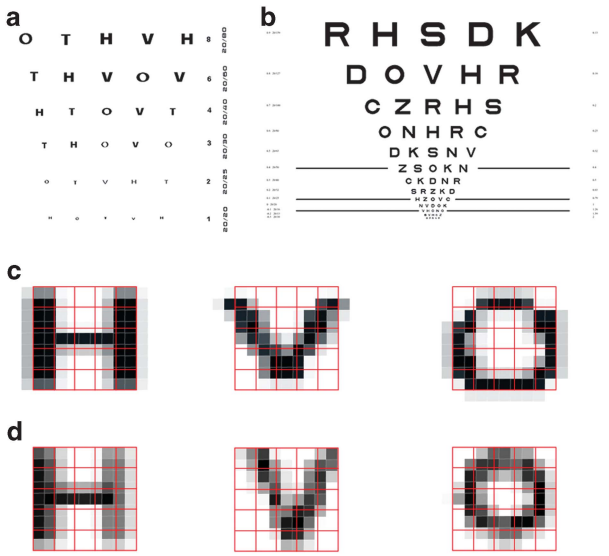


**Figure 1** Screenshots made by iPhone 6 for (a) EyeHandBook app and (b) app designed by the author. Zoomed optotypes for the 20/20 line of (c) EyeHandBook app and (d) app designed by the author.

consecutive levels above this. The detail for 20/20 is around 1.34 PS that is not physically possible to be displayed. In cases on which detail of the optotype does not coincide with an integer number of pixels or if the location of the detail does not fall exactly on a pixel, IOS uses a drawing interface for anti-aliased rendering.[2] Anti-aliasing[3] consists of contours smoothing by multiple gray levels of the neighboring pixels as shown in Figure 1c and d. Figure 1a shows the EyeHandBook and Figure 1b shows another app designed to test near VA at 40 cm according to the ETDRS standard. I performed a screenshot of both apps with an iPhone 6 and I zoomed them in order to check anti-aliasing effect on each app. Figure 1c shows that EyeHandBook fails in the standardized design of letters inside a 5 × 5 grid (width exceeds height, at least with iPhone 6). On the other hand, Figure 1d shows that the optotype of the ETDRS near chart is in a 5 × 5 grid but it has also poor definition. In conclusion, although disagreement between smartphone near charts and printed charts could be due to all the reasons that are described in the discussion,[1] authors do not mention what I believe is an important reason for the lack of agreement, the poor definition of optotypes due to PS in applications for testing near VA.

## Conflict of interest

R-VM has developed vision applications for smartphones and tablets that he currently distributes by the apple store.

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**Sir,**
**Comment on: 'Effectiveness of a smartphone application for testing near visual acuity'**

We read with interest the article by Tofigh *et al*,[1] which found a disparity in visual acuity measurement between the Eye HandBook (EHB) smartphone application compared to the conventional near vision card. The modern smartphone has become a ubiquitous possession in the developed world, with various applications granting the devices multifunctional utility to their users.[2] In ophthalmology alone, there has been an extraordinary 12-fold increase in the number of applications produced in recent years.[3] This gives the smartphone a potentially important role for both patients and physicians.

However, alongside this rapid expansion, studies suggest a worryingly small portion are actually affiliated with an academic institution or association. Results from one study demonstrated only 68 ophthalmology apps, out of 182 analyzed, had documented professional involvement,[3] which correlates with the findings of a study investigating a wider range of surgical specialties.[4] Therefore, the approach by Tofigh *et al* in validating this smartphone application is indeed welcome and needed. However, the study's own findings raise the point that professional involvement may not be enough, which is another point overlooked in this field of research. The EHB is one of the most popular ophthalmology applications, endorsed by the American Academy of Ophthalmology,[5] yet this study highlights legitimate concerns regarding its accuracy in measuring visual acuity.

Beyond purely top–down regulation, we feel that encouraging an attitude of evidence-based application production is now needed. Although this is being adopted in the production of some applications, there is still much work to be done in ensuring that further applications are medically accurate and clinically robust. There is a risk that avoiding such an approach may lead to the rapid dissemination of outdated or outright false information through haphazard and unregulated application production. With the potential for new applications to quickly land directly into the hands of patients and doctors alike, we call for more validation of