

## Conceptual advantages of using pupil to limbus ratio over absolute pupil diameter

Sir,

We have read with interest the article of Mojumder *et al.* on the use of pupil to limbus ratio to measure anisocoria<sup>[1]</sup> and we would like to share our experience on this topic:

Some studies have demonstrated that digital photography is a very convenient tool for the measurement of pupil diameter in ophthalmic practice. It offers several advantages over other methods (inexpensive, accurate, more repeatable than other techniques, provides long lasting documentation, and eases masked observations).<sup>[2]</sup> However to take absolute measures of pupil diameter, a ruler or a template should be included in the photo, and care should be taken to its placement and orientation to avoid parallax effects. Otherwise, only relative measures of pupil diameter can be taken. Using relative measures of pupil diameter (pupil to limbus ratio), simplifies the process of taking the photos (it is not necessary to include extra elements in the picture) and could have important advantages over using absolute measurements in different situations:

- Intra-subject comparisons: This method is impeccable to monitor changes on pupil diameter on the same subject. As Mojumder *et al.* demonstrate in their article, this is a really convenient approach to monitoring pupil changes in the UCI. It can also be useful in the differential diagnosis of anisocoria (to monitor pupil change when apraclonidine, cocaine, or pilocarpine 0.125 tests are performed)
- Inter-subject comparisons: To compare pupil diameters among different subjects this method has also important advantages over the methods that use absolute measurements. Pupil diameter is correlated with limbus diameter. A 6-mm-pupil is probably maximum mydriasis in a subject with 8-mm-corneas, but it is not certainly maximum mydriasis in a subject with 13-mm-diameter-corneas. In the first case, pupil diameter is 75% of the maximum

pupil diameter whereas in the second case pupil diameter is 46% of the maximum pupil diameter

- Defining anisocoria: Expressing pupil diameter as a percentage of limbal diameter makes possible a more logical definition of anisocoria. As pupil diameter has a wide distribution (young myopic subjects have bigger pupils than old hyperopic subjects),<sup>[3]</sup> we find the classical definition of anisocoria very rigid. A 0.5 mm difference should be considered significant in a subject with 2.5 mm pupils, but it is probably insignificant in a patient with 6-mm-pupils
- Comparing photopic and scotopic pupils in the same subject: In our experience, using absolute measures, anisocoria tends to be greater under scotopic conditions (not only on Horner syndrome, also in physiologic anisocoria and anisocoria related to parasympathetic lesions). This fact is probably due to bigger scotopic pupils. This bias could be avoided using the relative change in a pupil to limbus ratio between photopic and scotopic pupil.

In summary, we agree with the authors. Pupil to limbus ratio is not only a very convenient method to measure pupils. It also has many conceptual advantages.

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### Conflicts of interest

There are no conflicts of interest.

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