Reviewer’s report

Title: Comparison of corneal endothelial cell measurements by two non-contact specular microscopes

Version: 1 Date: 19 April 2015

Reviewer: Ioannis N Petropolis

Reviewer’s report:

This is a study which is very well presented and discussed and the clinical problem is very well explained. There are however two major limitations in my opinion. The first is the sample size, 18 patients is too small a sample to generate any conclusions on the agreement of the two machines. The second is the novelty of the study, the authors say that they used machines of "different serial numbers". I am wondering how this is relevant to a scientific study. Is there any evidence that these instruments perform something different in any way compared to other instruments of different serial numbers? My comments are as follows:

Major Compulsory Revisions

1) Sample size. Is there any power analysis evidence? If not I would suggest the authors calculate this and perhaps increase their sample size and repeat their analysis.

2) lines 114-122, page 5. The correlation for ECD is high because the under/over-estimation of one instrument compared to the other is consistent. But this does not tell the whole story: it is a very small sample size and outliers could have a bigger than normal impact and skew the results towards either direction. Therefore the results are not generalizable to larger populations. We do not know wether this relationship is maintained for lower densities which is extremely important from a clinical perspective. Many instruments or softwares perform well for normative data but there is poor performance when assessing disease presence and severity. I would appreciate any comments from the authors about that.

3) Lines 141-143. This is a theoretical risk. I suggest the authors provide a citation or remove or change the statement.

4) Lines 158-164. I am confused by the methodology the authors used to calculate cells density. What does it mean “we included as many cells as possible”? Was that comparable between the instruments. The authors need to provide their rationale.

5) Lines 181-183. The authors state that in their already small sample size included corneal disease. In my opinion, Including a heterogeneous population with such a small sample size devalidates the results. The authors need to
perform a study with bigger and better structured cohort.

6) Lines 184-188. Although it is common for automated analysis to underestimate compared to manual analysis the authors do not justify how “measuring as many cells as possible” reduces variation. What if these cells are not truly cells but image artefacts?

7) General comment. What are the study limitations.

Discretionary Revisions

1) Line 101, page 5. It should be just called R.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Not suitable for publication unless extensively edited

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests