



## City Research Online

### City, University of London Institutional Repository

---

**Citation:** Koenig, S. F., Montesano, G., Fang, C. E. H., Crabb, D. P., Jayaram, H. & Clarke, J. (2024). Response to: 'Comment on: 'Effect of trabeculectomy on the rate of progression of visual field damage''. Eye, 38(7), pp. 1395-1396. doi: 10.1038/s41433-023-02876-3

This is the published version of the paper.

This version of the publication may differ from the final published version.

---

**Permanent repository link:** <https://openaccess.city.ac.uk/id/eprint/31958/>

**Link to published version:** <https://doi.org/10.1038/s41433-023-02876-3>

**Copyright:** City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

**Reuse:** Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

---

---



CORRESPONDENCE OPEN



# Response to: 'Comment on: 'Effect of trabeculectomy on the rate of progression of visual field damage''

© The Author(s) 2023

Eye; <https://doi.org/10.1038/s41433-023-02876-3>

## TO THE EDITOR:

We thank the authors of the letter [1] for their interest in our work and the editor for the opportunity to respond.

As mentioned in the letter, and in our paper [2], the development of media opacity due to cataract can reduce visual field (VF) sensitivity. It is also documented that glaucoma surgery can accelerate the formation of cataract [3]. This effect would produce a worsening of global VF indices, such as Mean Deviation (MD), counteracting the stabilising effect of surgery. However, as the authors of the letter correctly suggest, cataract surgery can improve MD, contributing to a less negative rate of progression in the post-operative period.

We should clarify that our main analysis did not use MD, but rather pointwise sensitivity. This allowed us to avoid biases from the perimetric measurement floor (Fig. 1 in the original paper). This analysis would not be possible with MD.

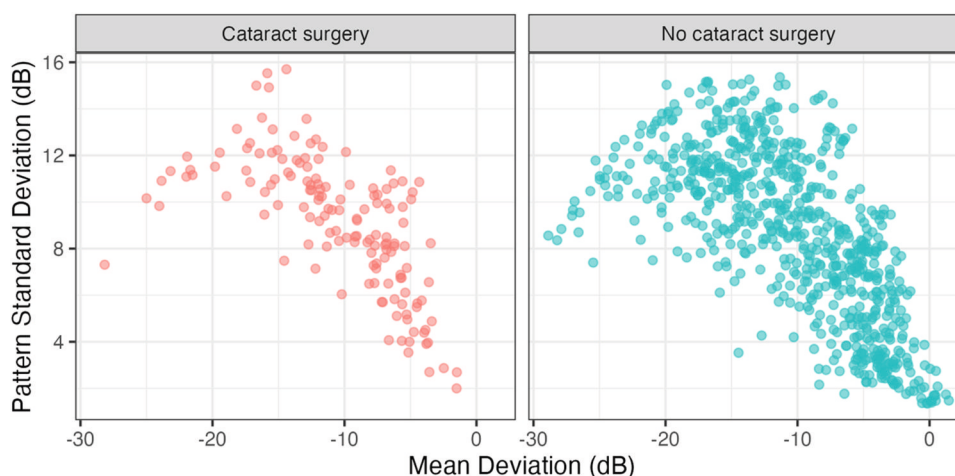
The authors of the letter suggested using Pattern Standard Deviation (PSD) to assess progression while minimising the effect of cataract surgery, perhaps misinterpreting the results of one of their references. Koucheki et al. [4] showed that changes in PSD after cataract surgery were mainly due to the increase in sensitivity in healthier locations (i.e. exhibiting changes independent of glaucoma progression). Moreover, PSD is inadequate to track

progression, because of its nonlinear relationship with glaucoma damage (both healthy and very advanced fields would have low PSD [5]). This was also the case for our cohort (see Fig. 1). Therefore, a change in PSD cannot be interpreted, in isolation, as indicative of either worsening or improvement of the VF. Moreover, the median MD of our patients at surgery was  $-10.84$  dB. This means that our metric of choice would need to track progression into the advanced stages, making measurements focused on the pattern of damage (pattern deviation or PSD) inappropriate.

However, to reassure the authors of the letter, we have performed our analysis after excluding patients who received cataract surgery. The results are largely similar to those obtained with the full dataset. The mean rate of progression before surgery was  $-0.93$  [ $-1.23$ ,  $-0.64$ ] dB/year (Mean [95% Credible Intervals]) and it was slowed down by  $0.61$  [ $0.20$ ,  $1.03$ ] dB/year ( $p_d = 0.0046$ ).

Susanna Friederike Koenig <sup>1,2</sup>, Giovanni Montesano <sup>3,4</sup>,  
Clarissa Ern Hui Fang <sup>1</sup>, David Paul Crabb <sup>3</sup>,  
Hari Jayaram <sup>1,4</sup> and Jonathan Clarke <sup>1,4</sup>

<sup>1</sup>Moorfields Eye Hospital NHS Foundation Trust, 162 City Road, EC1V 2PD London, UK. <sup>2</sup>Universitätsaugenklinik Ulm, Prittwitzstrasse 43, D – 89075 Ulm, Deutschland, Germany. <sup>3</sup>Optometry and Visual Sciences, City, University of London, London, UK. <sup>4</sup>NIHR Biomedical Research Centre of Ophthalmology, Moorfields Eye Hospital and UCL Institute of Ophthalmology, London, UK.  
✉ email: [susanna.koenig@uniklinik-ulm.de](mailto:susanna.koenig@uniklinik-ulm.de)



**Fig. 1** Distribution of pairs of Mean Deviation – Pattern Standard Deviation values in our cohort. The curvilinear relationship is evident in both groups of patients.

Received: 13 November 2023 Revised: 15 November 2023 Accepted: 28 November 2023

Published online: 22 December 2023

## REFERENCES

1. Hussain A, Baneke A, 'Response to: 'Effect of trabeculectomy on the rate of progression of visual field damage'. Eye (Lond). 2023, in press.
2. Koenig SF, Montesano G, Fang CEH, Crabb DP, Jayaram H, Clarke J. Effect of trabeculectomy on the rate of progression of visual field damage. Eye. 2023;37:2145–50. <https://doi.org/10.1038/s41433-022-02312-y>
3. Investigators A. The Advanced Glaucoma Intervention Study: 8. Risk of cataract formation after trabeculectomy. Arch Ophthalmol. 2001;119:1771–9. <https://doi.org/10.1001/archophth.119.12.1771>
4. Koucheiki B, Nouri-Mahdavi K, Patel G, Gaasterland D, Caprioli J. Visual field changes after cataract extraction: the AGIS experience. Am J Ophthalmol. 2004;138:1022–8. <https://doi.org/10.1016/j.ajo.2004.08.006>
5. Heo DW, Kim KN, Lee MW, Lee SB, Kim CS. Properties of pattern standard deviation in open-angle glaucoma patients with hemi-optic neuropathy and bi-optic neuropathy. PLoS ONE. 2017;12:e0171960. <https://doi.org/10.1371/journal.pone.0171960>

## FUNDING

Open Access funding enabled and organized by Projekt DEAL.

## COMPETING INTERESTS

The authors declare no competing interests.

## ADDITIONAL INFORMATION

**Correspondence** and requests for materials should be addressed to Susanna Friederike Koenig.

**Reprints and permission information** is available at <http://www.nature.com/reprints>

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2023