

Test-Retest Reliability of Visual Function Assessments in Pseudoxanthoma Elasticum

G Cancian¹, G Ansari¹, S Liakopoulos^{2,3}, C Dysli⁴, M Al-Sheikh⁵, JG Garweg⁶, S Michels^{7,8}, SF Terry⁹, M Pfau¹, K Pfau¹

¹. Department of Ophthalmology, Basel University Hospital, Switzerland; ². Department of Ophthalmology, University Hospital Cologne, Germany; ³. Department of Ophthalmology, Goethe-University Frankfurt, Germany;
⁴. Department of Ophthalmology, Inselspital, Bern University Hospital, Switzerland ⁵. Department of Ophthalmology, Stadtspital Zurich, Switzerland; ⁶. Berner Augenklinik, Zieglerstrasse 29, Bern, Switzerland
⁷. Eye Clinic Zurich West, Zurich, Switzerland; ⁸. Department of Ophthalmology, University of Zurich, Switzerland; ⁹. PXE International, Washington, DC, United States

✉ giuseppe.cancian@usb.ch

Background and Purpose

Slowing of **rod-mediated dark adaptation (DA)** is emerging as an early marker of functional impairment in patients with **Pseudoxanthoma Elasticum (PXE)**, offering potential as a metric to assess interventions aimed at mitigating disease progression. Despite its promise, the retest reliability of DA parameters in the PXE population **remains unexplored**.

This study evaluated the intersession repeatability of key visual function and DA parameters in PXE patients.

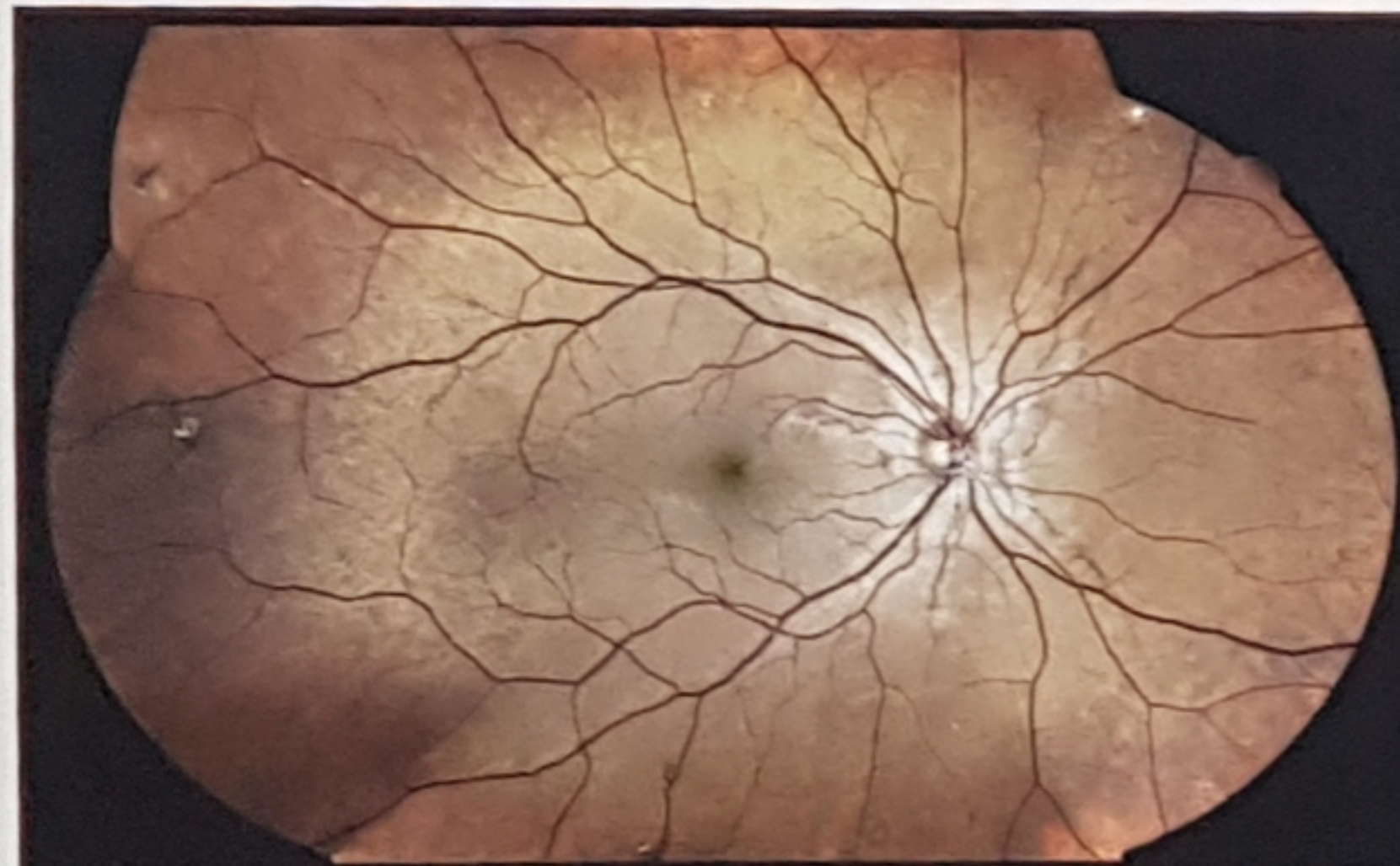


Fig. 1 – PXE hallmark features: peau d'orange and angioid streaks

Methods

- Recruitment: **PROPXE study** (clinicaltrials.gov identifier NCT05662085)
- Genetically confirmed PXE patients underwent comprehensive visual function assessments at **baseline (test)** and **two months later (retest)**
- Examinations included:
 - **Best-corrected visual acuity (BCVA)**;
 - **Contrast sensitivity function (CSF)-based acuity**
 - **Area under the log CSF (AULCSF)**
 - **Final threshold**
 - **Rod intercept time (RIT)**, at 8°, 15°, 30°, and 46° temporal to the fovea
- 95% coefficient of repeatability (CoR)** was calculated for each visual function biomarker to assess intersession reliability.

Results - Cohort characteristics

Patients (Eyes)	26 (26)
Female	54%
Mean age (± SD)	50 (± 12) years

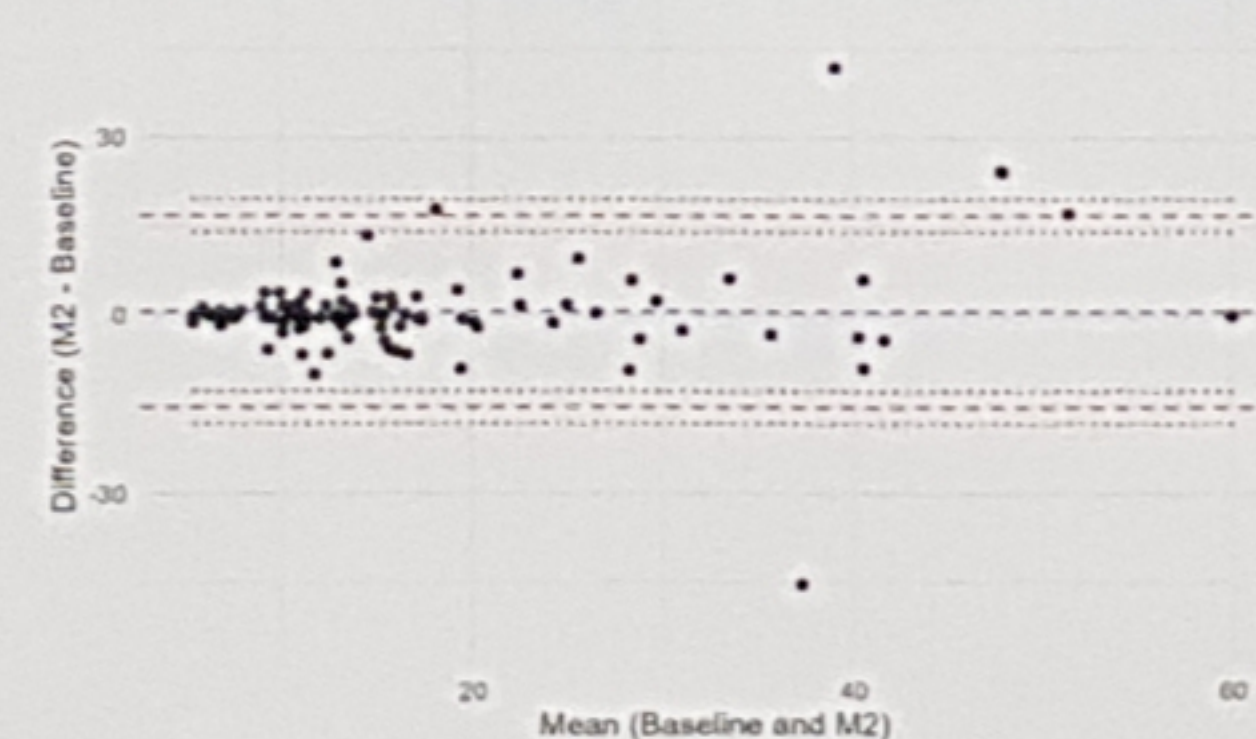
Results - Visual Function

Visual function parameter	Coefficient of repeatability (CoR)
BCVA	0.193 logMAR
CSF Acuity	7.729 logMAR
AULCSF	0.303

Results – Dark Adaptometry

DA Parameter	CoR at different Retinal Eccentricities				
	8°	15°	30°	46°	Mean
Final threshold [log units]	0.96	0.77	0.79	1.01	0.88
RIT [min]	13.41	12.22	18.25	19.60	15.87

Final Threshold – Bland-Altman Plot



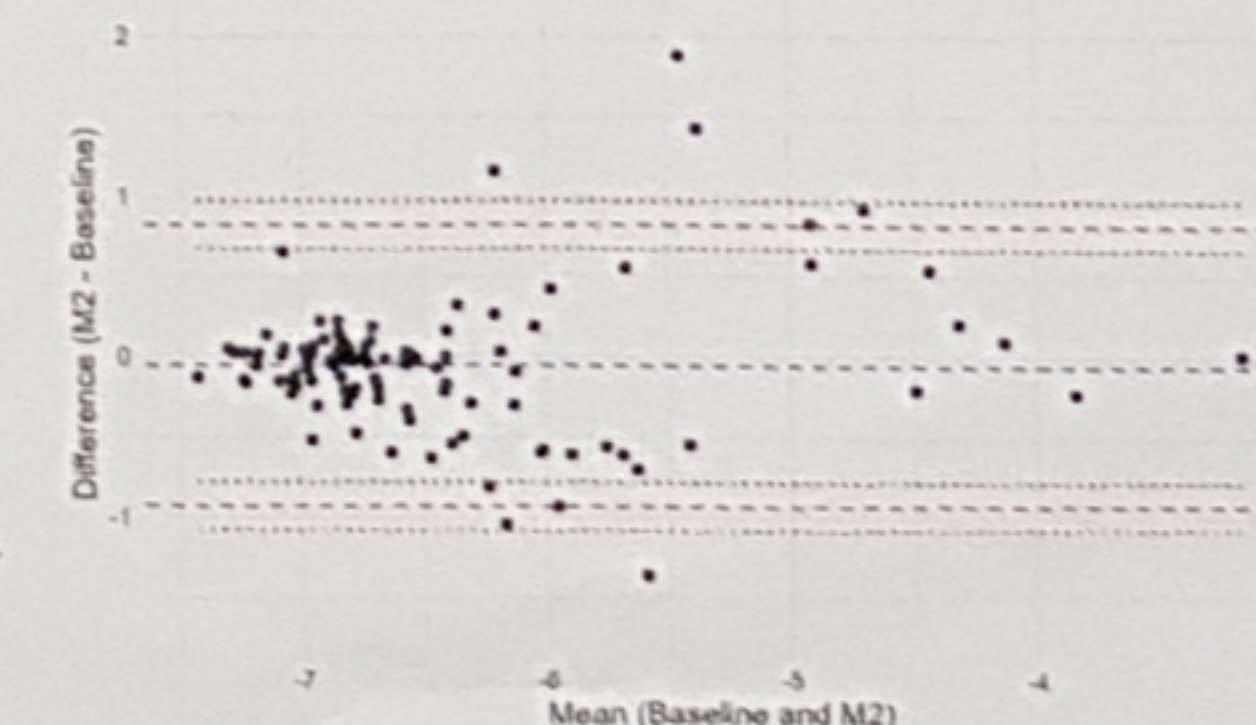
Bland-Altman plot illustrating agreement between two **Final Threshold** measurements at Baseline and at the 2-months Follow-up.

- **Blue dashed line:** mean bias;
- **Red dashed lines:** ±1.96 SD limits of agreement (LoA);
- **Red dotted lines:** LoA confidence intervals.

Rod-Intercept Time (RIT) – Bland-Altman Plot

Bland-Altman plot illustrating agreement between two **RIT** measurements at Baseline and at the 2-months Follow-up.

- **Blue dashed line:** mean bias;
- **Red dashed lines:** ±1.96 SD limits of agreement (LoA);
- **Red dotted lines:** LoA confidence intervals.



Conclusion

- This study establishes the **95% repeatability coefficients** for **key visual function and DA parameters** measured with the MonCvONE device in patients with PXE.
- These metrics provide a critical **baseline for determining clinically significant changes** in visual and rod function in future research and clinical trials.
- **Translational relevance:** Evaluating the repeatability parameters of visual function and DA is essential for the precise interpretation of results in upcoming studies and trials that use these measures.

Financial Disclosures

GC: iCare (R), F. Hoffmann-La Roche (R); GA: iCare (R), F. Hoffmann-La Roche (R); SL: Apellis (R, C), AbbVie (R, C), Astellas (R, C), Bayer (R, C), Biogen (R, C), Novartis (R, C, F), Heidelberg Engineering (R), Roche (R, F), Zeiss (R), Janssen (C); CD: none; MAS: none; JG: none; SM: none; SFT: none; MP: BrightFocus (F), iCare (F), F. Hoffmann-La Roche (E); KP: iCare (F), Daiichi Sankyo (C), Bayer (R), Heidelberg Engineering (R), F. Hoffmann-La Roche (R).

References

1. Nguyen CT, Fraser RG, Tan R, et al. Longitudinal Changes in Retinotopic Rod Function in Intermediate Age-Related Macular Degeneration. *Invest Ophthalmol Vis Sci*. 2018;59(4):AMD19-AMD24.
2. Nigalye AK, Hess K, Pandlik SJ, Jeffrey BG, Cukras CA, Hussain D. Dark Adaptation and Its Role in Age-Related Macular Degeneration. *J Clin Med*. 2022;11(5).
3. Owsley C, McGwin G, Clark ME, et al. Delayed Rod-Mediated Dark Adaptation is a Functional Biomarker for Incident Early Age-Related Macular Degeneration.
4. Hess K, Gliem M, Birtel J, et al. IMPAIRED DARK ADAPTATION ASSOCIATED WITH A DISEASED BRUCH MEMBRANE IN PSEUDOXANTHOMA ELASTICUM. *Retina*. 2020;40(10):1988-1995.
5. Pfau M, Jolly JK, Wu Z, et al. Fundus-controlled perimetry (microperimetry): Application as outcome measure in clinical trials. *Prog Retin Eye Res*. 2021;82.

Contact: Pfau Lab

PD Dr. Kristina Pfau
Bonn, Germany
Basel, Switzerland
Mail: Kristina.Pfau@ukbonn.de
<https://www.pfaulab.com>

