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Test-Retest Variability and Biological Variation of Binocular Pupillometry in Healthy and mTBI Cohorts:

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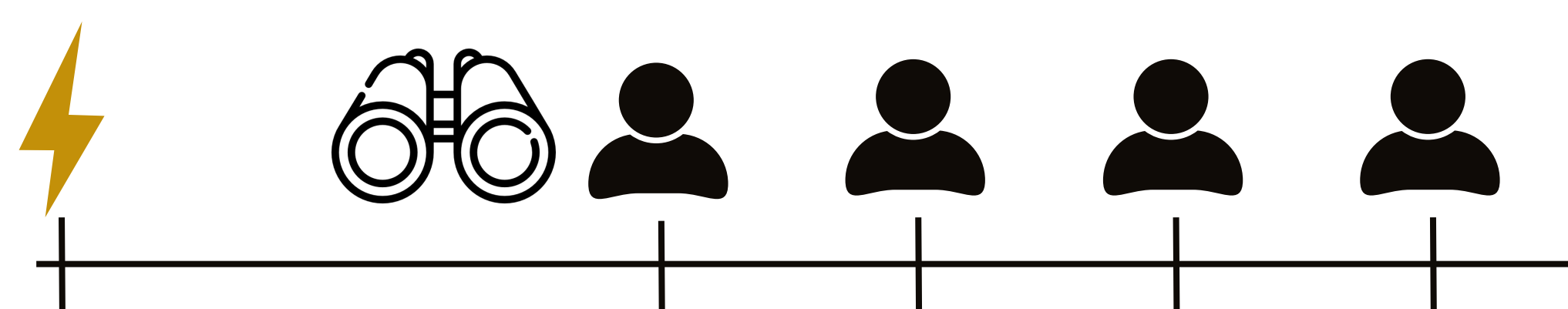
● BACKGROUND

Mild Traumatic Brain Injury (mTBI) encompasses ~70–90% all TBIs¹. 50% patients suffer **long term symptoms**² including **visual dysfunction**³, but it is not currently possible to predict long-term morbidity.

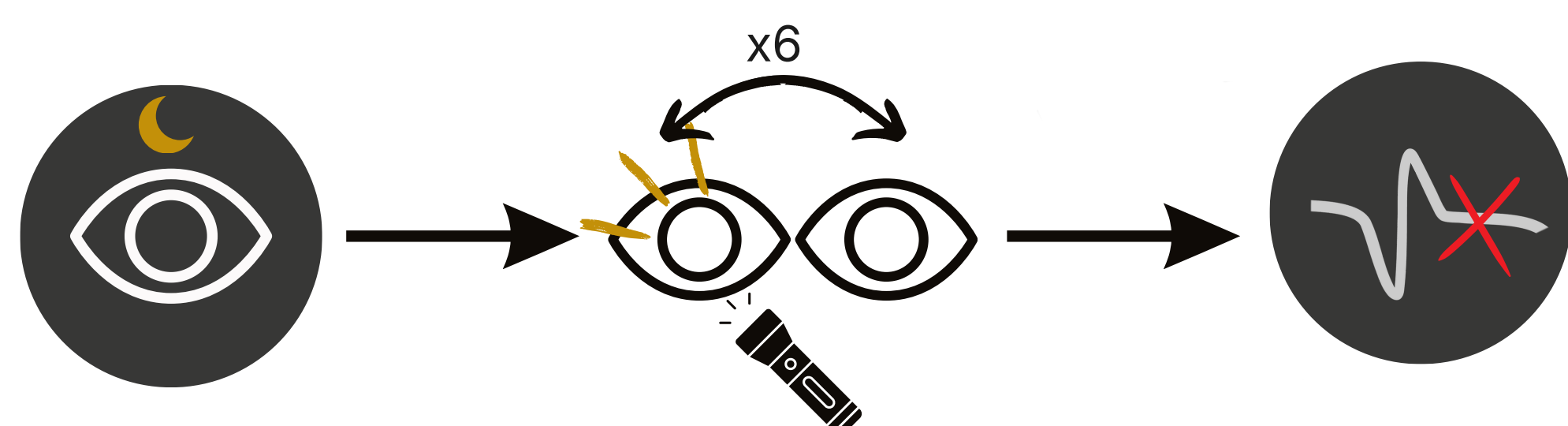
Quantitative pupillometry is a potential mTBI biomarker. Alterations in **pupil size, constriction/dilation velocity, and symmetry** are found in mTBI patients⁴. While test-retest variability is well-described for monocular pupillometry, measures for **binocular pupillometry** are **lacking**, and **biological variability** in mTBI cohorts is not reported.

● METHODS

mTBI patients and healthy controls were assessed on **4 occasions over a 12 day period**, starting within **21 days after injury** for the mTBI cohort.

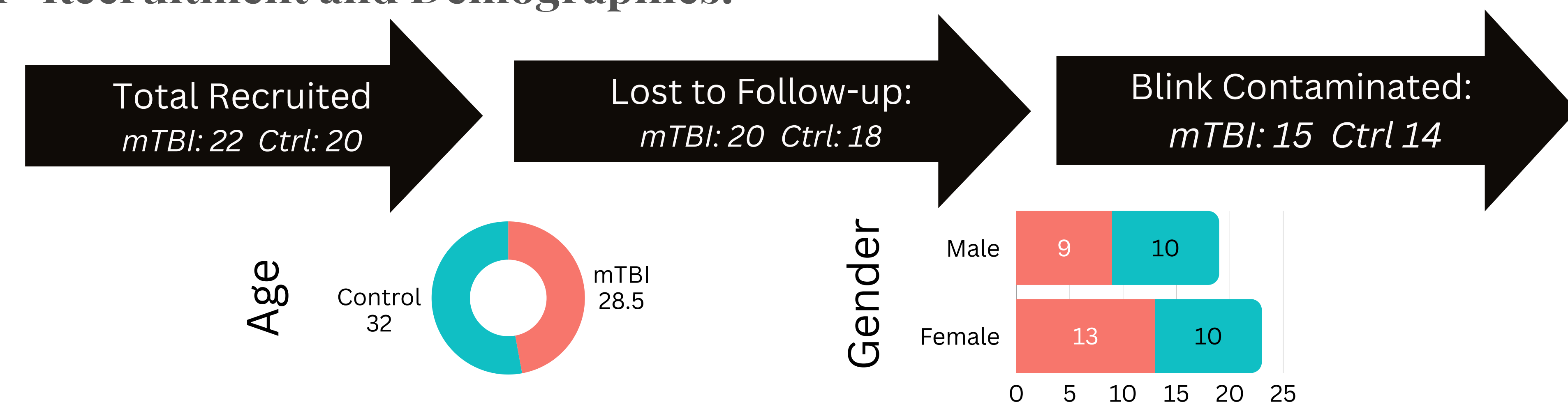


DP-2000 binocular pupillometer (NeuroOptics, USA) assessed **dark-adapted pupil diameter** over 5 seconds (no light stimulus), and static and dynamic pupil measures with **6 pulses alternating eyes**.



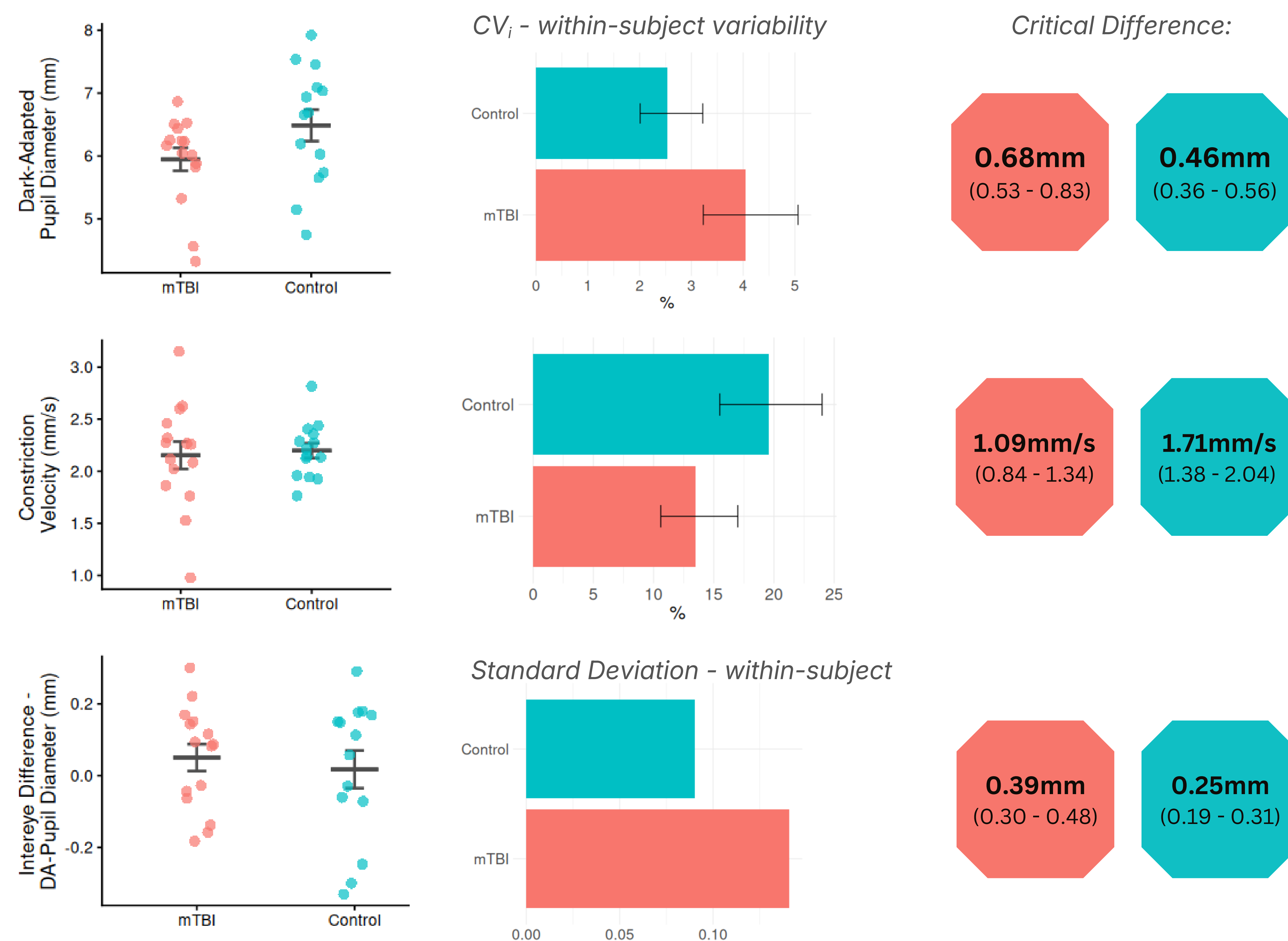
● RESULTS

1- Recruitment and Demographics:



2 - Biological Variability of Quantitative Pupillometry Measures:

● Static measures (Pupil Diameter) are less variable than dynamic measures like (Constriction Velocity) ●



● DISCUSSION

We present test-retest and **biological variability of binocular pupillometry in healthy and mTBI cohorts**. We present critical differences to reflect the minimum alteration likely to be clinically significant in each of our cohorts, supporting use as a clinical tool.

Variability for **static measures** like Pupil Diameter is **low**. **Dynamic measures** like Constriction Velocity are **more variable**.

Pupillometry is overall an **effective biomarker** for small alterations relating to **TBI**, but variability in **dynamic measures** may **mask subtle changes**

● REFERENCES

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- [4] Bashir M et al. J Clin Neurosci. 132, 111003 (2025).

● ACKNOWLEDGMENTS

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