

Structure and function comparison of cup/disc ratio and perimetric mean deviations



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PURPOSE

- Structural loss often precedes functional loss in cases of primary open-angle glaucoma, thus driving the importance of early detection and monitoring.
- While established correlations between structure and function in glaucomatous eyes have been studied in various modalities (particularly in traditional narrow field of view (FOV) cameras which assume a constant pixel to distance mapping), it is vital to establish these correlations in widefield (WF) cameras which are widely available and have not yet been assessed.

RESULTS

- Structure/functional correlations were observed for both hCDR ($\rho = -0.46$) and vCDR ($\rho = -0.61$) measurements as compared with 24-2 MDs. In Fig 1, glaucomatous eyes prove less consistent as compared with healthy controls.
- Consistent with literature, this study showed CDRs using the standard measurement tool in CLARUS are larger in glaucomatous eyes.

CONCLUSIONS

- This study demonstrated a capability of providing structure/function comparisons using an UWF fundus imager and perimeter.
- This measurement technique could be useful for enhancing research in the field of glaucoma.
- The study also confirms the trend that in the early to medium/advanced stages of glaucoma, the vCDR has a stronger correlation than hCDR and that vCDR is traditionally more useful in determining glaucoma severity than hCDR.

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METHODS

- An UWF slit-scanning ophthalmoscope (CLARUS™ 500, ZEISS, Dublin, CA) and an automated perimeter (HFA3 Model 860 perimeter, ZEISS, Dublin, CA) were used to acquire color fundus photography images and perimetric data respectively.
- As part of a retrospective analysis, healthy (10 eyes, avg. age 56.4 ± 8.9 , 44.3 – 73.1 years) subjects and glaucomatous (14 eyes, avg. age 72.5 ± 9.3 , 60.9 – 97.9 years) patients were used.
- Mean deviation (MD) from 24-2 SITA Standard (SS) visual fields (VFs) (extracted from 24-2C) were used to assess global function.
- Due to the use of a 90° FOV camera, the constant distance assumptions on narrow FOV cameras are not held.
- The automated measures resulting from manual annotations are tracked internally.
- Cup/disc ratios (CDR) from three independent/blind graders were computed and averaged from manual annotations using the default caliper measurement tool in CLARUS software to annotate horizontal and vertical cup and disc lengths.
- Both ratios (hCDR and vCDR) were compared to 24-2 MDs using Spearman correlations.

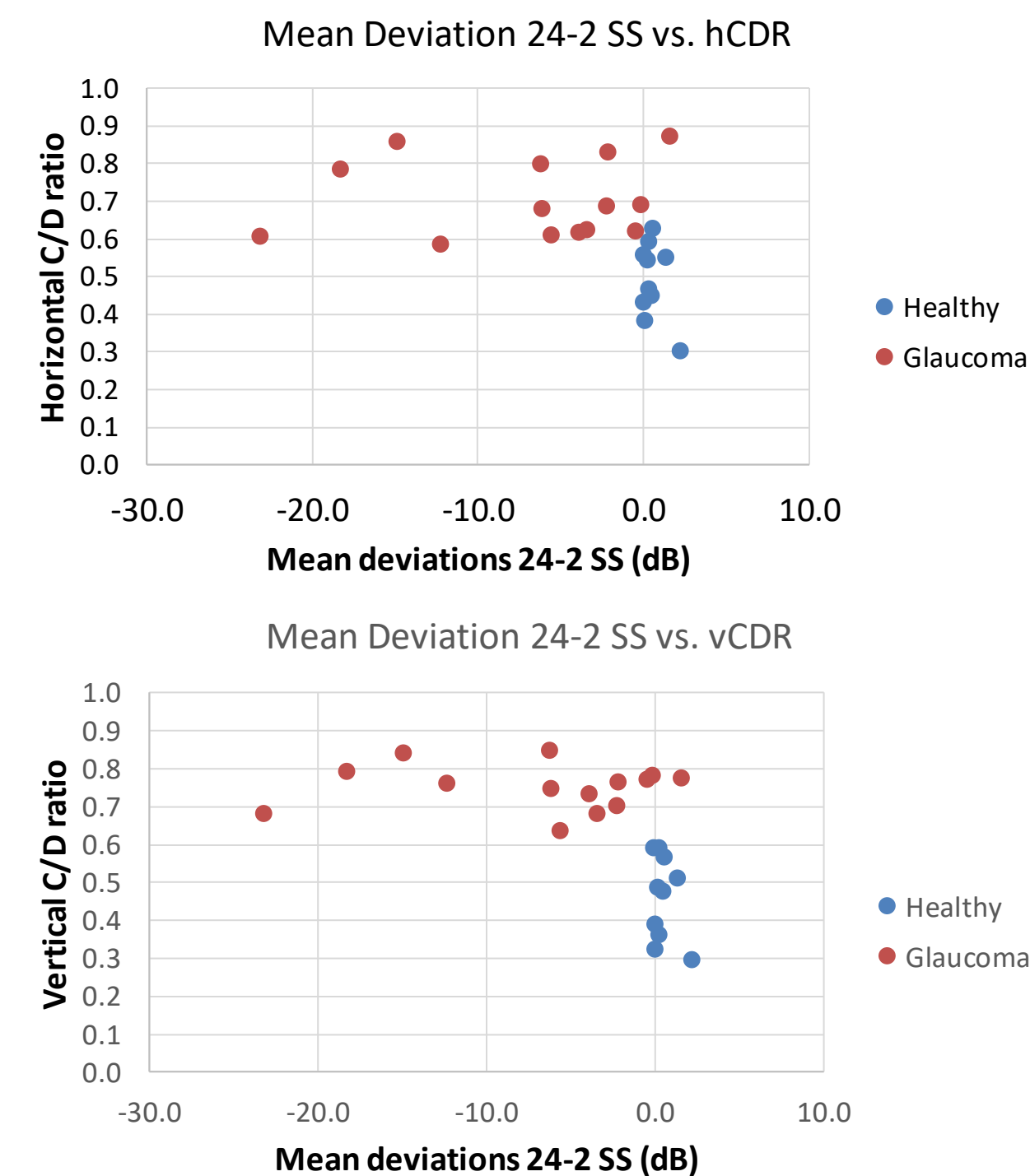


Figure 1. 24-2 SS MD VF values compared with hCDRs and vCDRs for healthy and glaucomatous eyes.

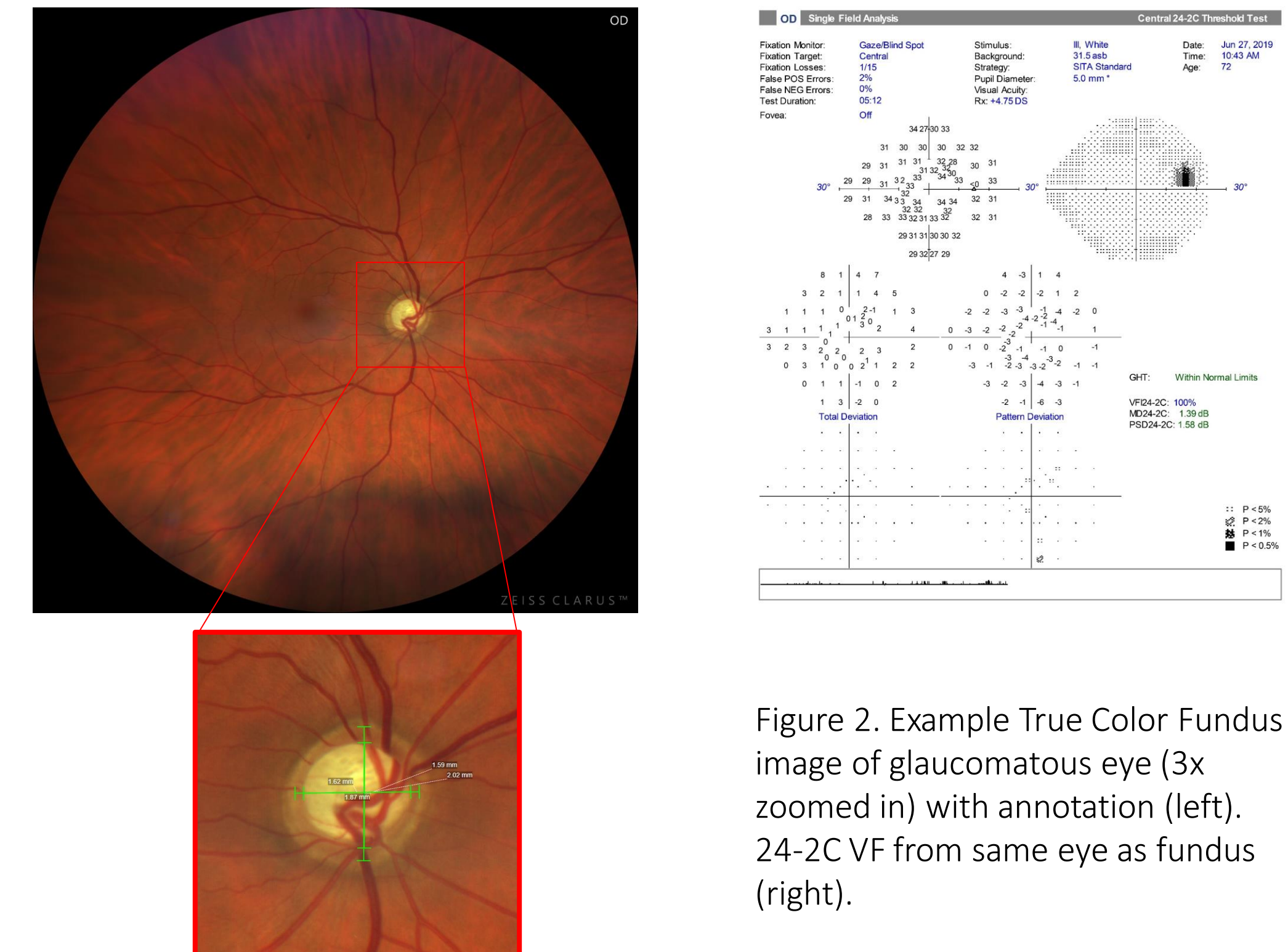


Figure 2. Example True Color Fundus image of glaucomatous eye (3x zoomed in) with annotation (left). 24-2C VF from same eye as fundus (right).

