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Inter- and Intra-reader Agreement on Quantitative Subretinal Drusenoid Deposits OCT Segmentation in Intermediate Age-Related Macular Degeneration

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Objective

Recently, **subretinal drusenoid deposits** (SDD) have increasingly gained recognition as a **risk factor for disease progression** in age-related macular degeneration (AMD)[1,2]. Due to the subtle nature of SDD, **quantification** by humans remains **challenging**. The analysis aims to assess **the inter- and intra-reader agreement** for **SDD** quantification on optical coherence tomography (OCT) in **intermediate AMD** (iAMD).

Patients and Methods

- **10 eyes of 10 patients** with iAMD were imaged with 20°x20° **Spectralis OCT** (Heidelberg Engineering)
- Manual delineation of stage 2 and 3 SDD lesions in **10 B-Scans per OCT** (B-Scans 2, 5, 10, 15, 20, 30, 49, 70, 80, 90)
- **Three expert readers annotated twice**
- Inter- and intra-reader agreement calculated using Intersection over Unit **(IoU)**, Dice Coefficient **(DC)** and Intraclass Correlation Coefficient **(ICC)**

Results

- Annotation of **4,822 SDD** in total
- number of SDD: **ICC_1 = 0.951** (95%CI 0.929 - 0.967), **ICC_2 = 0.938** (95%CI 0.902 - 0.962)
- Inter-reader mean **IoU = 41.94 - 50.49%**; intra-reader mean **IoU = 48.98 - 57.80%**
- Inter-reader mean **DC = 58.48 - 66.75%**; intra-reader mean **DC = 65.43 - 73.75%**

Disclosure Block
AE (none), GSR (none), SF (none), KK (none), VM (none), SSW (none), HB (Financial Support: Heidelberg Engineering), US-E (Consultant/Contractor: Heidelberg Engineering; Financial Support: Heidelberg Engineering)

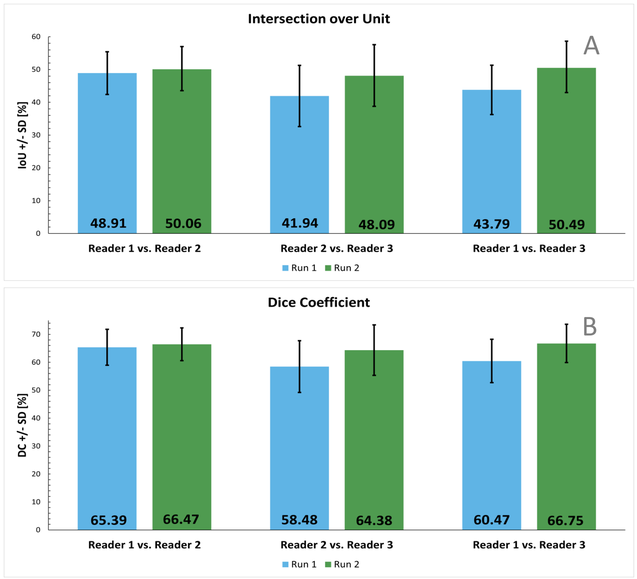

Figure 1: (A) mean IoU and Standard deviations (SD) from Reader 1 vs. 2, Reader 2 vs. Reader 3, Reader 1 vs. Reader 3 in Annotation Run 1 and 2 **(B)** mean DC and SD from Reader 1 vs. 2, Reader 2 vs. Reader 3, Reader 1 vs. Reader 3 in Annotation Run 1 and 2

Conclusion

- **Excellent agreement** of stage 2 and stage 3 SDD **lesion number** on OCT demonstrate the reliability as a ground truth for validating an artificial intelligence algorithm
- Moderate to substantial inter-reader agreement underscore **difficulties of quantifying SDD pixel-wise**
- Automated SDD quantification would be a step forward on consistent and rapid SDD image analysis

References

1. Marsiglia M, Boddu S, Bearelly S, et al. Association between geographic atrophy progression and reticular pseudodrusen in eyes with dry age-related macular degeneration. *Invest Opthalmol Vis Sci.* 2013; 54: 7362.
2. Pumariega NM, Smith RT, Sohrab MA, LeTien V, Souied EH. A prospective study of reticular macular disease. *Ophthalmol.* 2011; 118: 1619–1625.

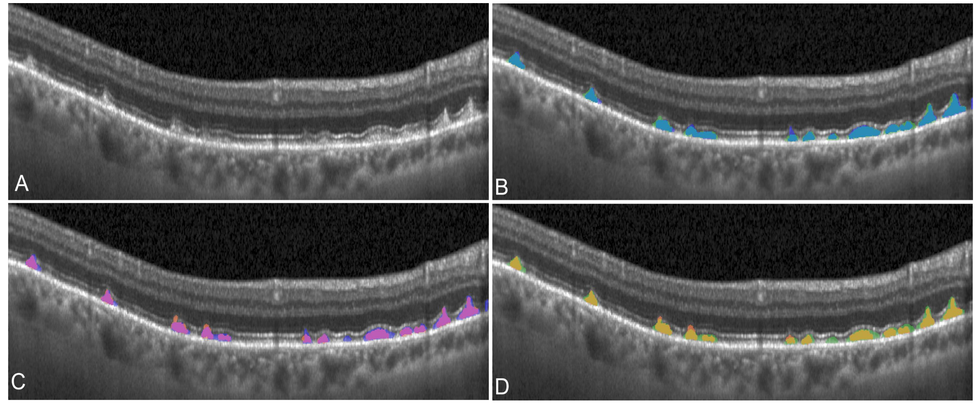

Figure 2: Example of substantial inter-reader agreement on stage 2 and 3 SDD lesions. **(A)** Original B-Scan **(B)** SDD delineations by Reader 1 in green vs. SDD delineations by Reader 2 in dark blue; overlapping delineations in light blue **(C)** SDD delineations by Reader 2 in dark blue vs. SDD delineations by Reader 3 in orange; overlapping delineations in pink **(D)** SDD delineations by Reader 1 in green vs. SDD delineations by Reader 3 in orange; overlapping delineations in yellow

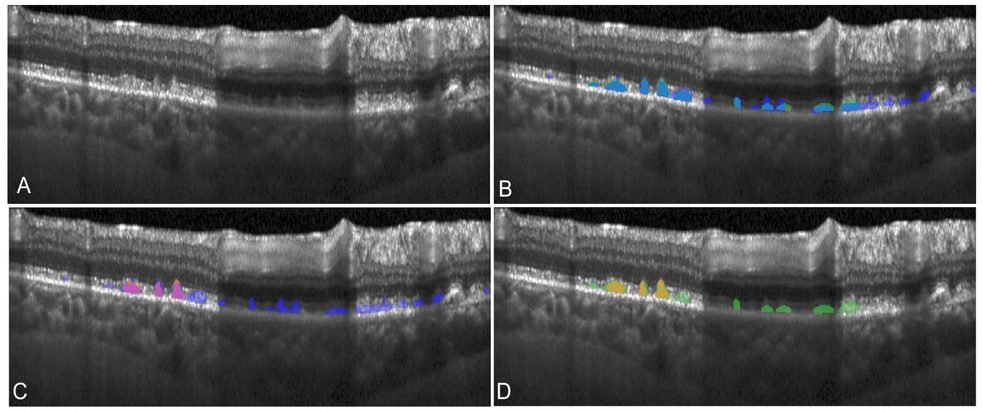

Figure 3: Example of weaker inter-reader agreement on stage 2 and 3 SDD lesions. **(A)** Original B-Scan **(B)** SDD delineations by Reader 1 in green vs. SDD delineations by Reader 2 in dark blue; overlapping delineations in light blue **(C)** SDD delineations by Reader 2 in dark blue vs. SDD delineations by Reader 3 in orange; overlapping delineations in pink **(D)** SDD delineations by Reader 1 in green vs. SDD delineations by Reader 3 in orange; overlapping delineations in yellow