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## Introduction

- Blue fundus autofluorescence (FAF) is the primary imaging technique used for diagnosing geographic atrophy (GA) and is regarded as the gold standard for detecting and monitoring its progression.<sup>1,2</sup>
- However, FAF is not as available as near-infrared (NIR) images, which are embedded in ocular coherence tomography (OCT) devices.<sup>3</sup>
- Moreover, FAF has some limitations including the hypo autofluorescence of the fovea, which may lead to an overestimation of GA in that area.<sup>4</sup>

## Objective

- The primary objective of this study was to assess the correlation between the appearance of GA in NIR and FAF images, using image registration and binary mask tools.
- This study aims to compare the area of GA regions between FAF and NIR images at presentation and at follow-up visits to the progression of atrophic regions.

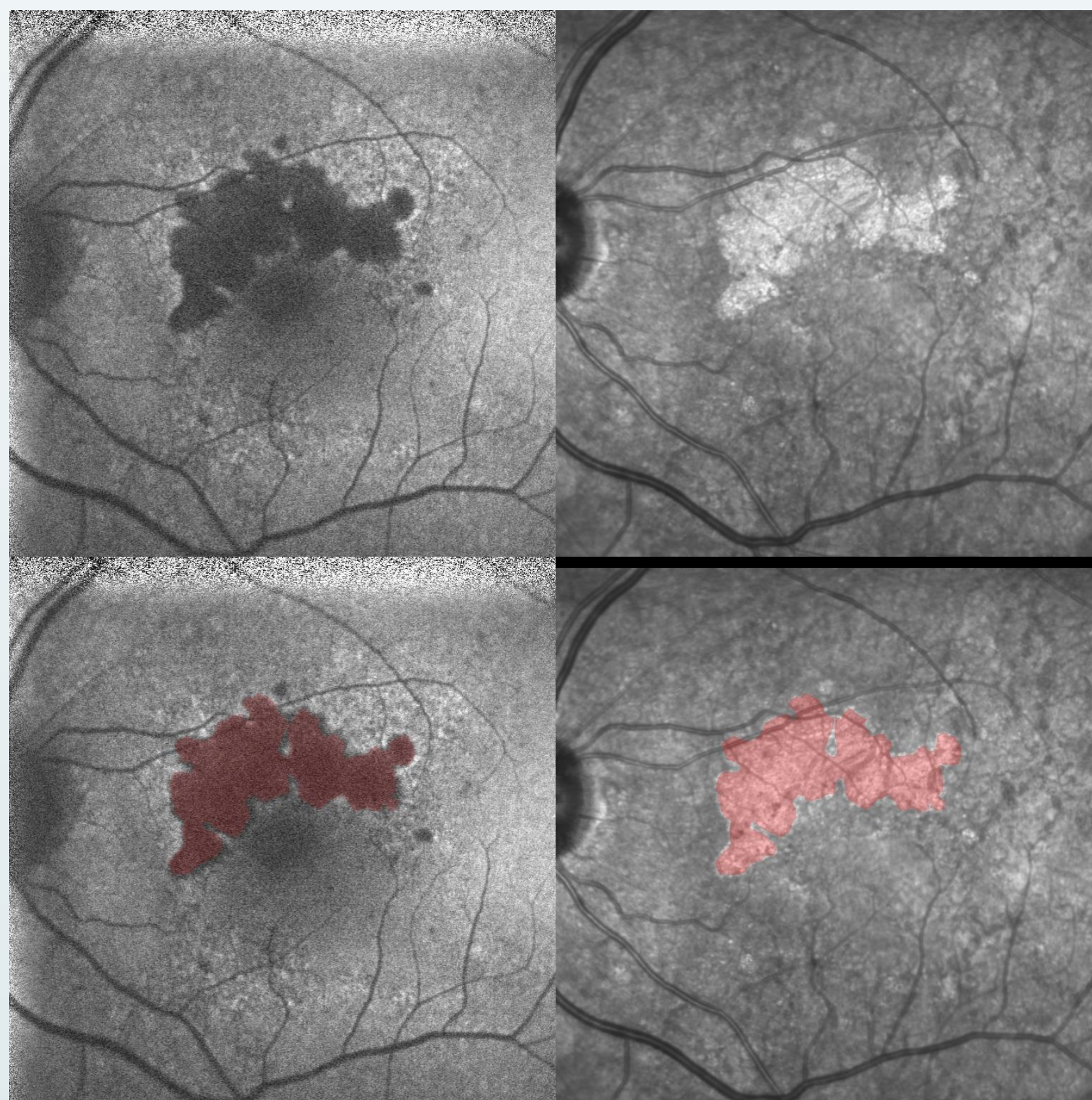


Figure 1. FAF image of a GA area (top left) and the corresponding NIR image (top right). Bottom images: the GA annotated area in each image is marked in red.

## Methodology

- NIR and FAF (Spectralis, Heidelberg Engineering, Heidelberg, Germany) images were acquired from the same patient and eye, on the same day. Unfocused images and other pathologies resembling GA were excluded. The GA regions were validated by two retina specialists (OG, RA). All images were fully anonymized before analysis. (Figure 1)
- Polygonal segmentation to delineate the boundaries of the atrophic regions was performed in both the NIR and FAF images.
- Images were converted to polygon annotations of GA with binary masks.
- Similarity between the GA regions in the NIR and FAF images was measured using Intersection over Union (IoU) and the Dice coefficient.

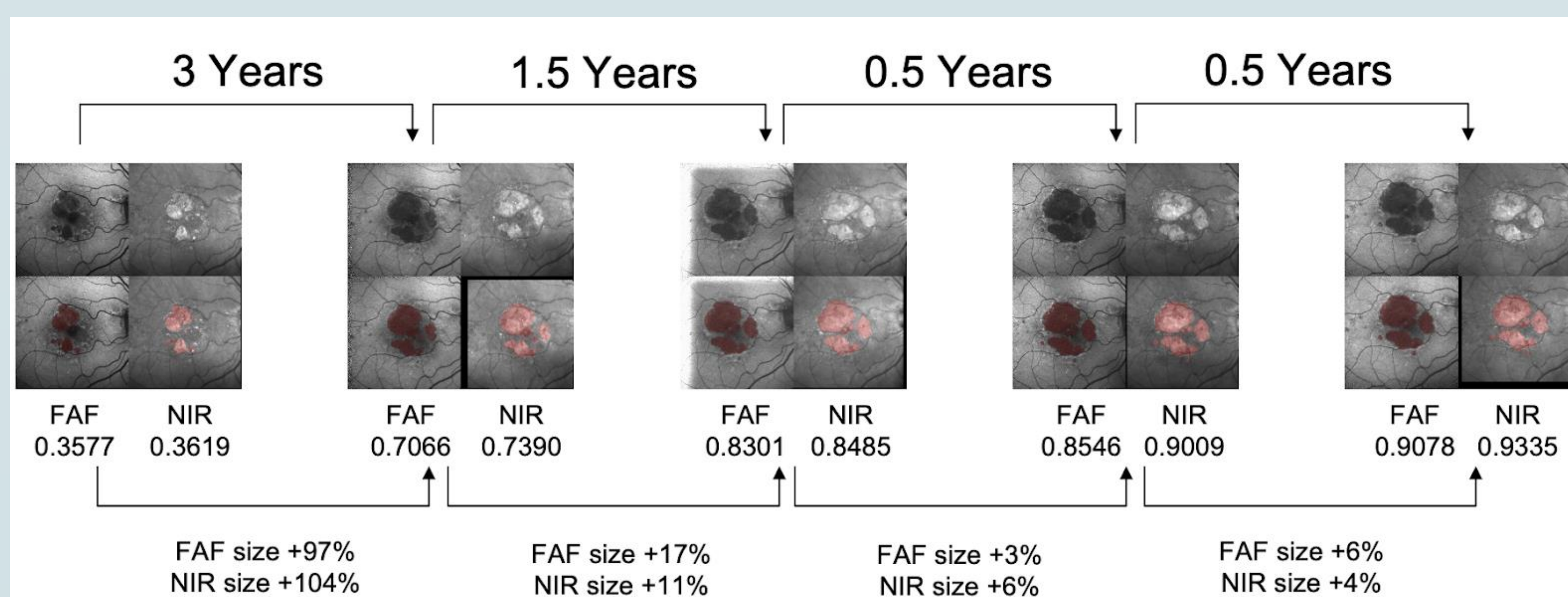


Figure 2. GA size growth rate on each modality

## Bland-Altman of IR vs FAF

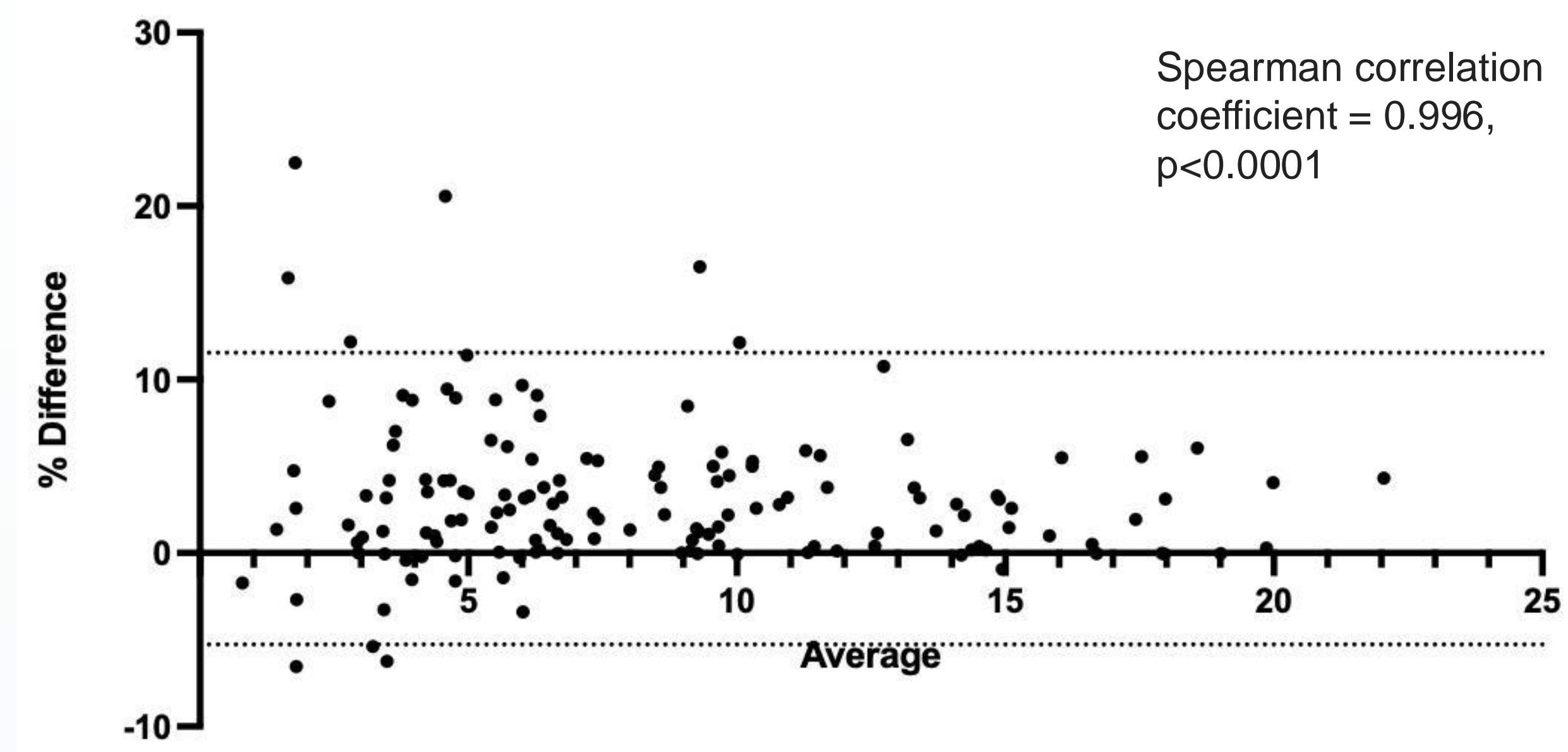


Figure 3. Bland-Altman plot demonstrating high correlation in area size for each modality.

## Results

- The dataset comprises 146 pairs of images of fifty-three eyes of thirty-seven patients.
- The mean IoU across all 146 image pairs was 0.916±0.081, indicating a high degree of overlap between the GA regions segmented in NIR and FAF images. The mean Dice score was 0.954±0.048 (median 0.968).
- On average, the percentage difference between the IR and FAF mask sizes was 3.77%±4.2%, with a median of 2.83%. (Figure 2)
- The Spearman correlation coefficient was 0.996 p < 0.0001 (Figure 3)
- For temporal progression, the Spearman correlation coefficient was 0.823, p < 0.0001. (Figures 4,5).

## Conclusion

- A strong correlation was demonstrated between GA regions in both modalities with high mean and median values for IoU and Dice coefficients With **over 91% overlap** in GA regions across both imaging modalities.
- NIR imaging is particularly valuable for diagnosing GA and monitoring its progression, and we observed a high degree of overlap between NIR and FAF images in GA regions. NIR shows promise as a reliable method for evaluating GA, providing accurate identification and assessment, making it a useful tool for clinicians and a potential alternative or complement to FAF imaging.

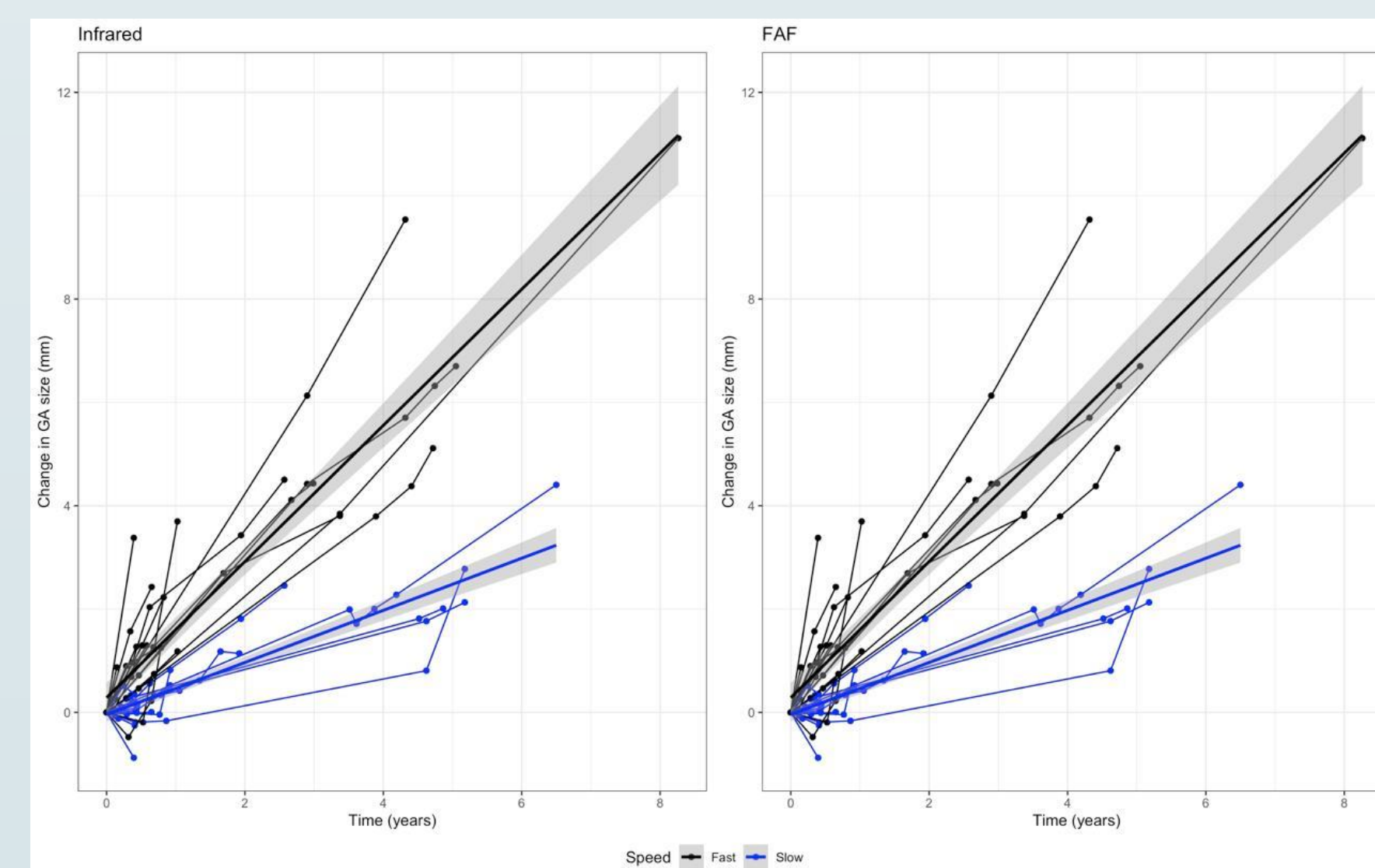


Figure 3. Progression slopes in area size in each eye demonstrated by NIR (left) and FAF (right)

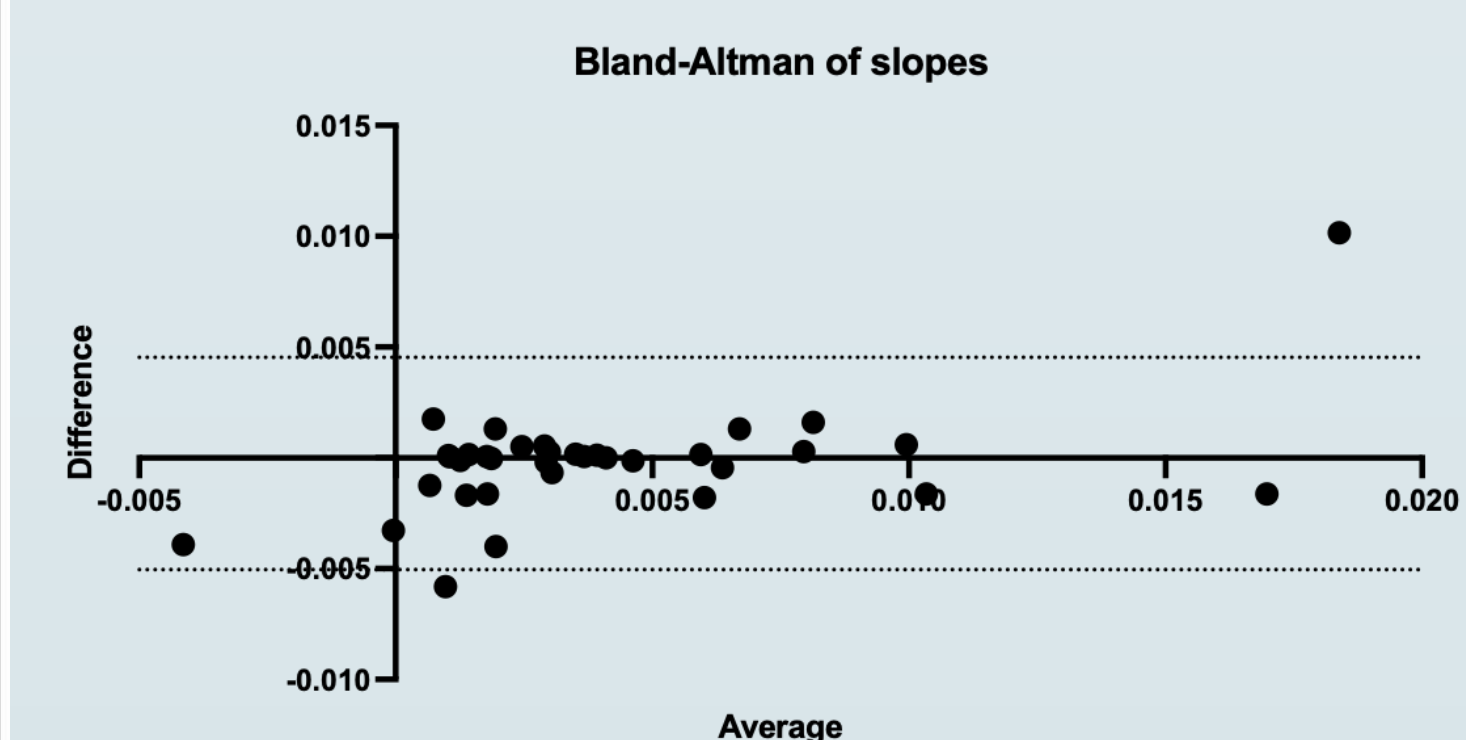


Figure 4. Bland-Altman plot demonstrating high correlation in area size progression for each modality.

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