

# Anterior chamber depth as a novel independent predictor of glaucoma following congenital cataract surgery

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## Introduction

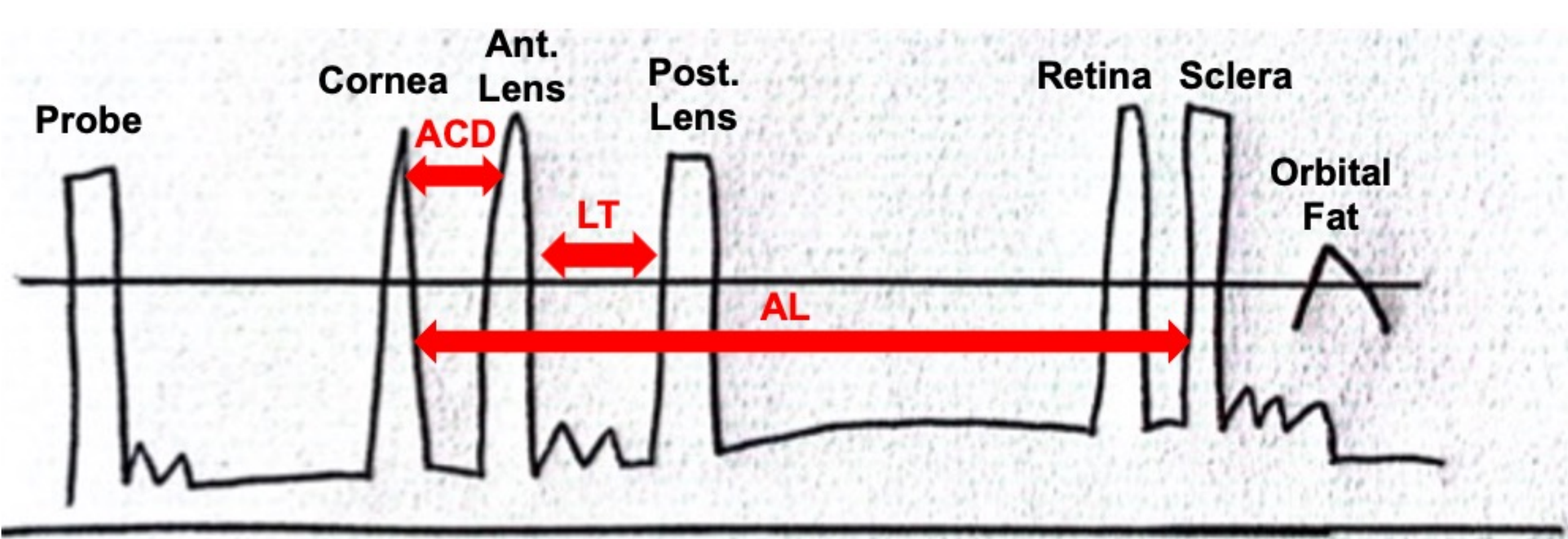
- The Infant Aphakia Treatment Study (IATS), a multi-center, randomized, controlled clinical trial sponsored by the National Eye Institute, compared the outcomes of unilateral cataract surgery either with or without an intraocular lens implant (IOL) in infants between 1-7 months of age.<sup>1</sup>
- There remains a knowledge gap in understanding if lens thickness (LT), axial length (AL), and anterior chamber depth (ACD) impacts the likelihood of glaucoma in patients who have undergone cataract removal in infancy.
- We investigated if there is an association between LT, AL, and ACD with glaucoma development in the IATS population, and to assess whether a-scan biometry parameters inform risk of glaucoma.

## Purpose

This study evaluated LT, AL, and ACD in eyes with congenital unilateral cataract as a predictor for glaucoma-related adverse events 10 years following congenital cataract surgery.

## Methods

LT, AL, and ACD from a-scan biometry collected during the Infant Aphakia Treatment Study (IATS) was evaluated as a predictor of glaucoma related adverse events at 10 years following congenital cataract surgery. Among the IATS cohort of 114 subjects, LT, AL, and ACD data were available from 79 subjects in at least one eye. Missing data were due to a-scan malfunction or illegible scans.



ACD= Anterior chamber depth  
LT= Lens thickness  
AL= Axial length

Figure 1: A-scan biometry reading

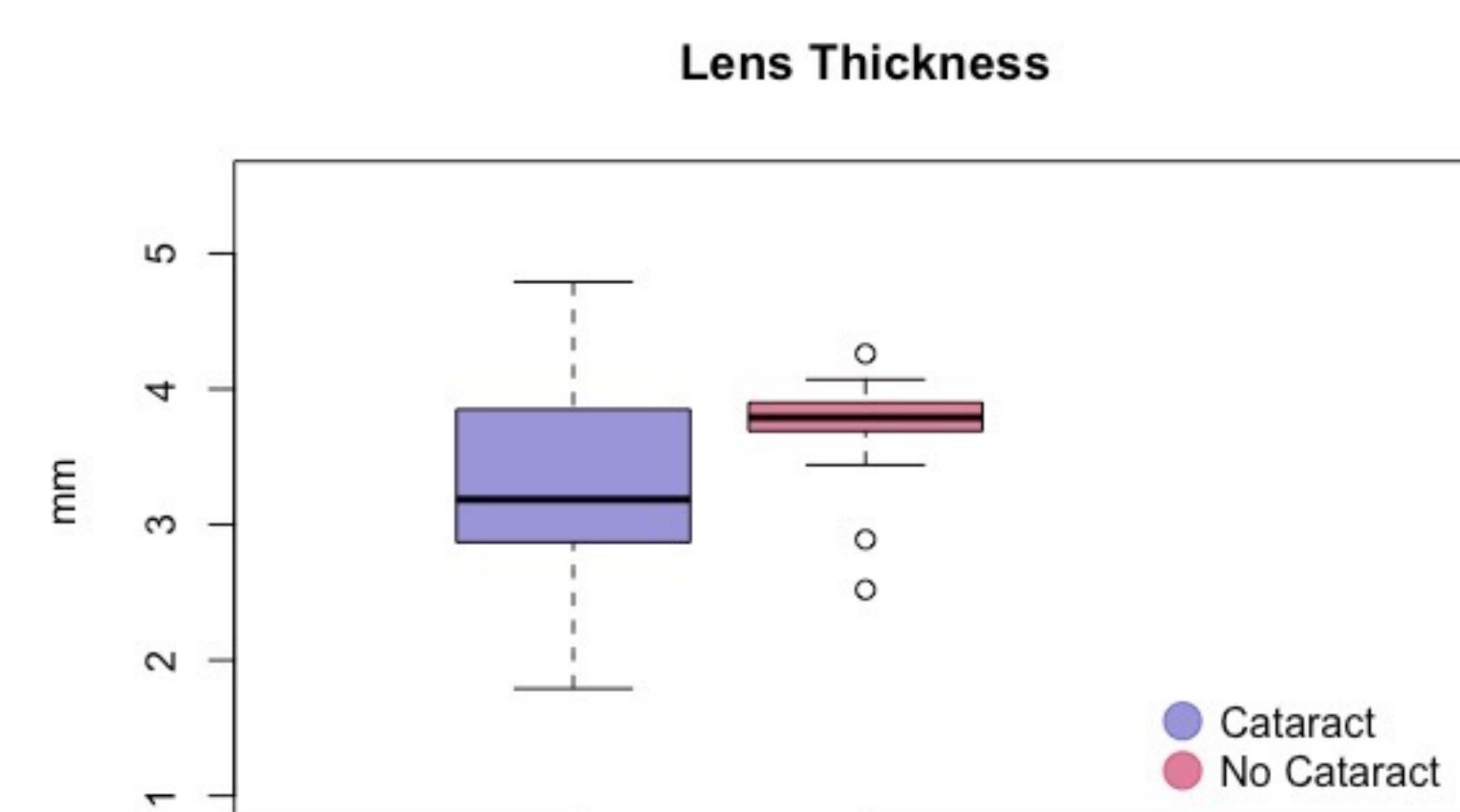
## Results

Table 1: A-scan biometry results

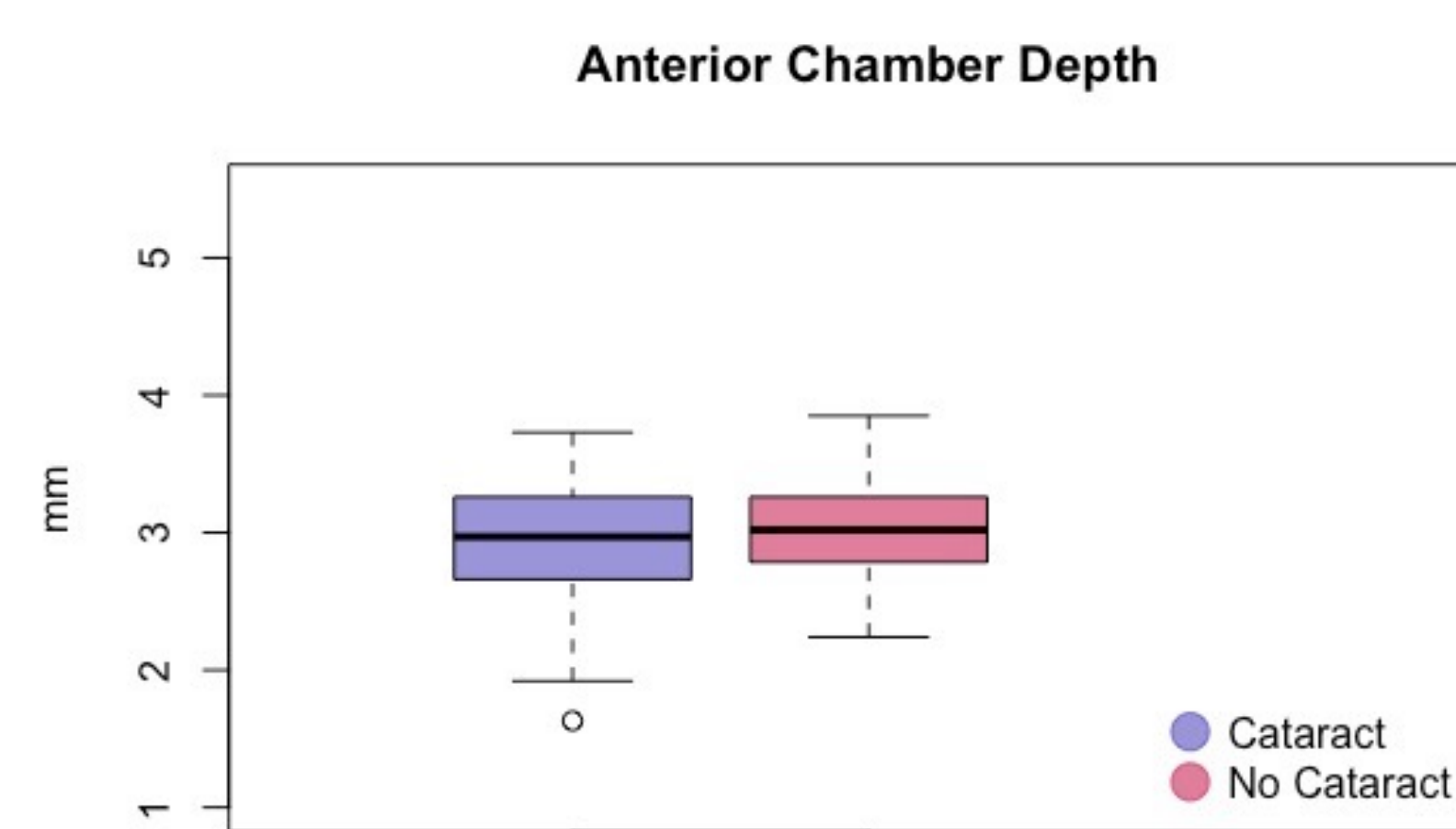
N=79	
Mean anterior chamber depth (ACD)	2.98 ± 0.39 mm
Mean axial length (AL)	18.36 ± 1.12 mm
Mean lens thickness (LT)	3.52 ± 0.53 mm

## Results

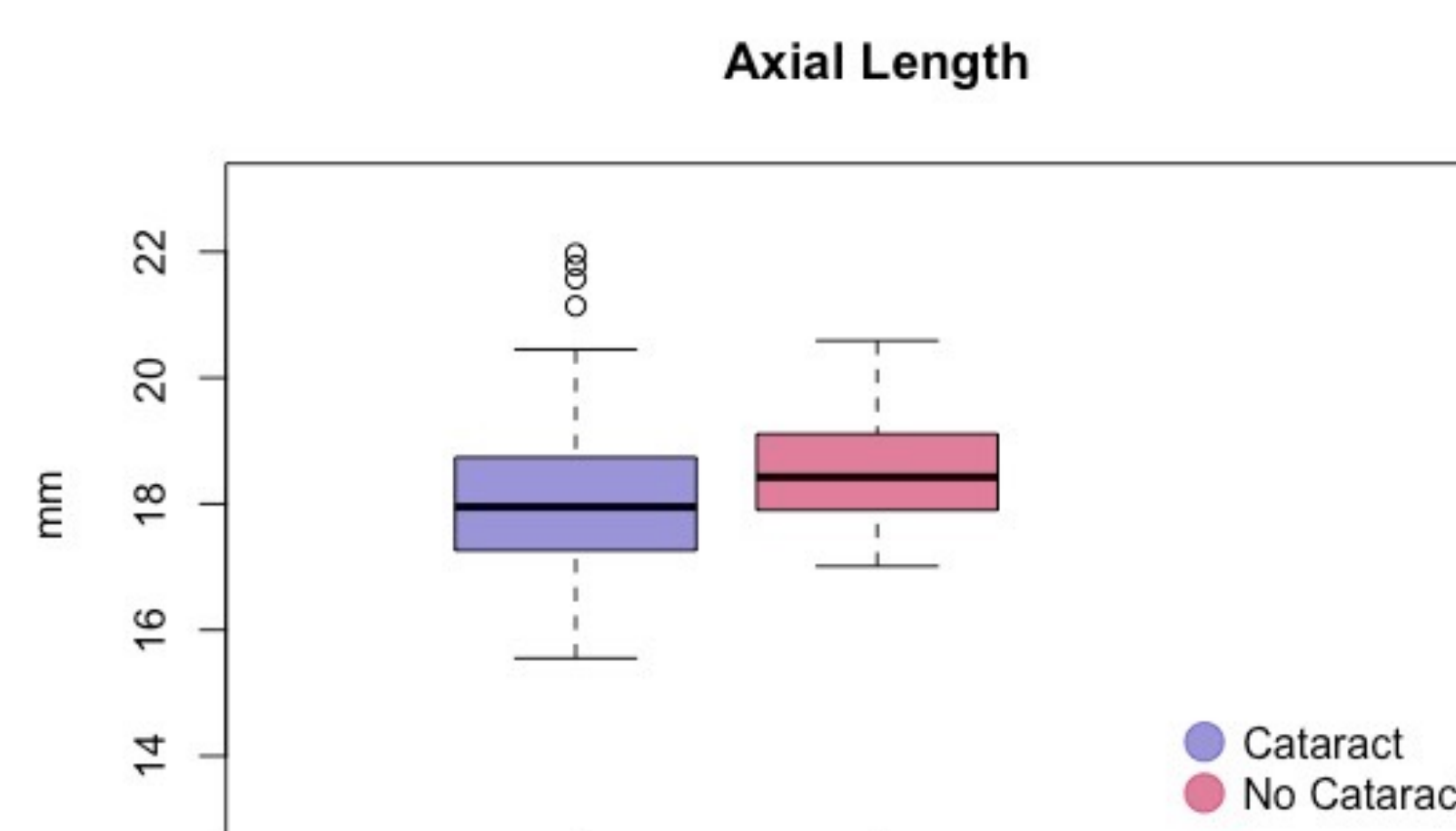
How does LT, ACD, AL compare in cataract vs control eyes?



**Figure 2A:** Mean LT was significantly thinner in eyes with cataract (3.26 +/- 0.65 mm) compared to their contralateral control eye (3.77 +/- 0.36 mm) ( $p < 8.2E-10$ ).



**Figure 2B:** Mean ACD between cataract and control eyes was not significantly different. ACD was similar between the cataract eye (2.95 +/- 0.19 mm) and control eye (3.02 +/- 0.05 mm) of unilateral cataract ( $p = 0.2719$ ).

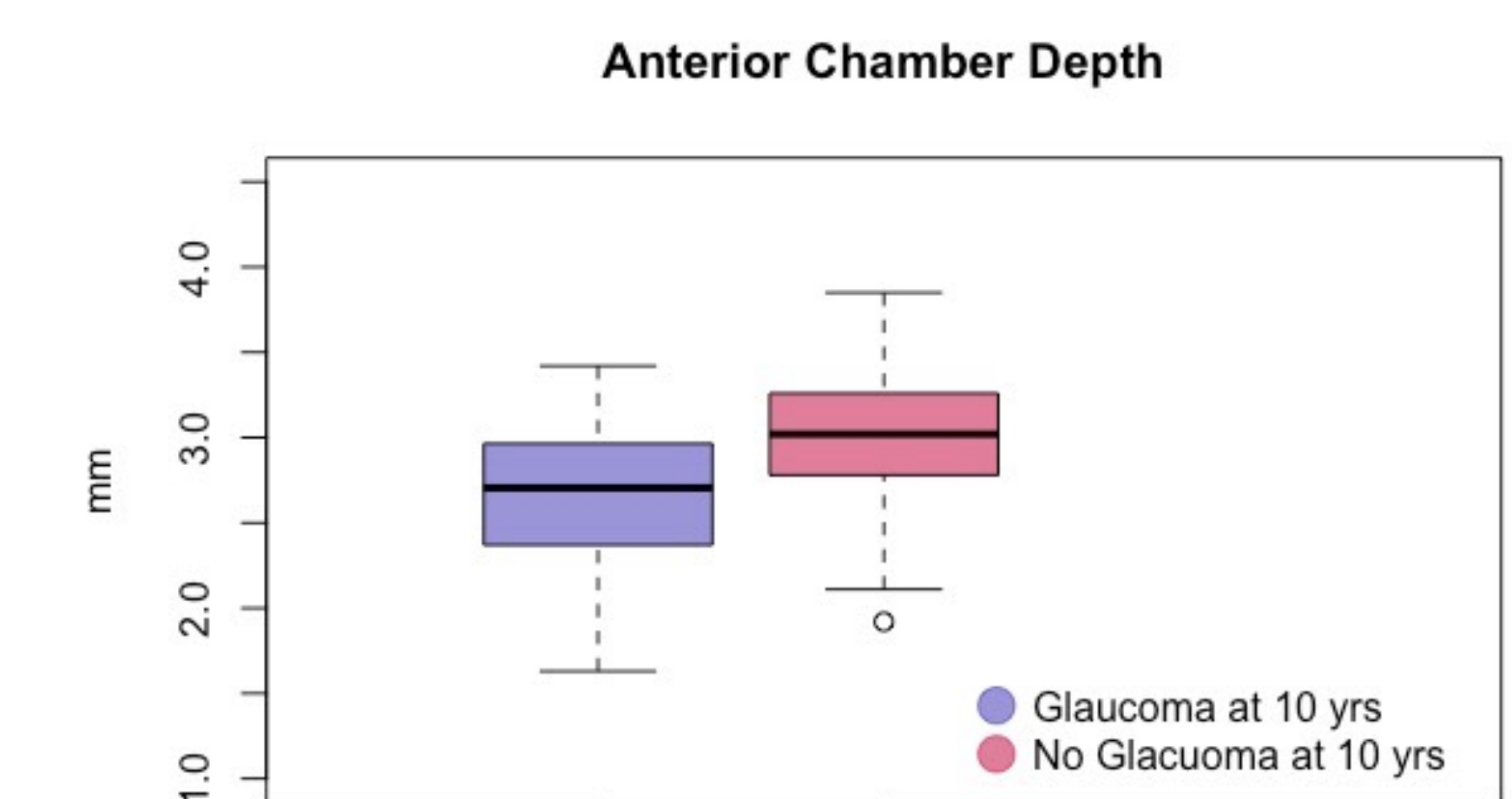


**Figure 2C:** Mean AL was significantly shorter in eyes with cataract (18.16 +/- 0.74 mm) compared to their contralateral control eye (18.57 +/- 0.09 mm) ( $p = 0.012$ ).

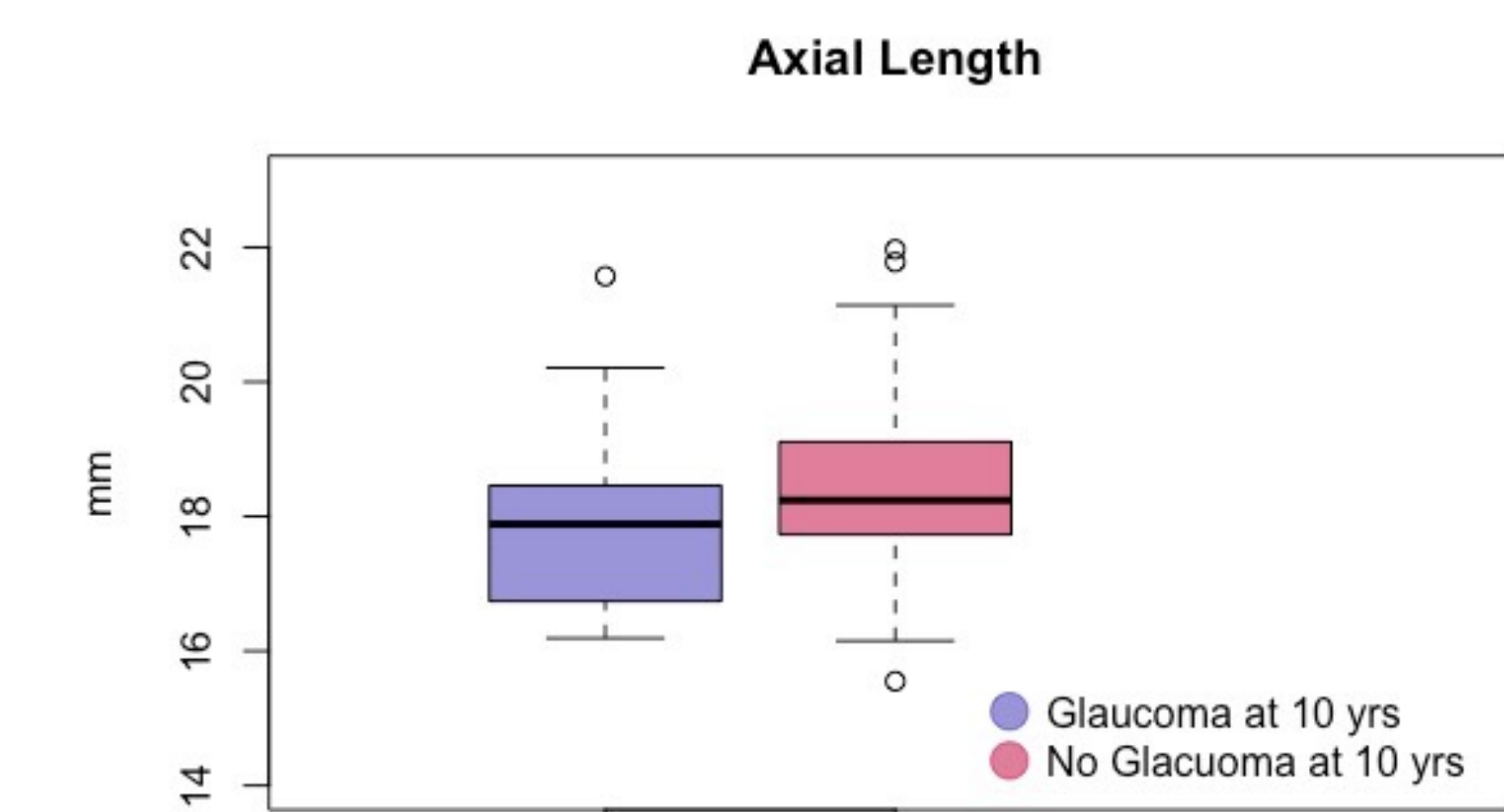
How does LT, ACD, AL compare in glaucoma eyes following congenital cataract removal compared to non-glaucoma eyes?



**Figure 2D:** Mean LT between glaucoma and non-glaucoma eyes was not significantly different. LT was similar between the glaucoma eye (3.28 +/- 0.67 mm) and non-glaucoma eye (3.55 +/- 0.14 mm) following unilateral cataract removal ( $p = 0.194$ ).



**Figure 2E:** Mean ACD was significantly shallower in eyes that developed glaucoma (2.66 +/- 0.62 mm) compared to eyes that did not develop glaucoma (3.02 +/- 0.09 mm) following unilateral cataract removal ( $p = 0.0104$ ).



**Figure 2F:** Mean AL between glaucoma and non-glaucoma eyes was not significantly different. AL was similar between the glaucoma eye (17.92 +/- 1.2 mm) and non-glaucoma eye (18.41 +/- 0.22 mm) following unilateral cataract removal ( $p = 0.165$ ).

Figure 2: Box plots representing mean a-scan biometry parameters in cataract vs. control eyes (A-C) and glaucoma vs. non-glaucoma eyes (D-F)

## Conclusions

- Lenses in unilateral congenital cataract eyes compared to contralateral controls are thinner.
- Axial lengths in unilateral congenital cataract eyes compared to contralateral controls are shorter.
- Eyes that develop glaucoma following congenital cataract surgery have shallower ACD.

## References

1. Freedman SF, Beck AD, Nizam A, Vanderveen DK, Plager DA, Morrison DG, Drews-Botsch CD, Lambert SR; Infant Aphakia Treatment Study Group. Glaucoma-Related Adverse Events at 10 Years in the Infant Aphakia Treatment Study: A Secondary Analysis of a Randomized Clinical Trial. JAMA Ophthalmol. 2021 Feb 1;139(2):165-173. doi: 10.1001/jamaophthalmol.2020.5664.

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