A Left eye

More aligned collagen

| /10 |
| /7 |
| /6 |
| /5 |
| /4 |
| /3 |
| /2 |
| /1 |

S

N   ONH   T

I

B

S

N   ONH   T

I

C

S

N   ONH   T

I

Figure S1:(A) Polar vector map of preferential collagen fiber orientation across a 15mm diameter posterior scleral specimen (n2l) from the left eye of a second non-glaucoma human donor, sampled at 0.5mm intervals, and viewed from the posterior side. The map has been mirror-flipped horizontally to enable direct comparison with right and left eyes in the main manuscript. **(B)** Polar vector plots mapped onto 3D posterior eye model. **(C)** Regional map showing average polar plots within the 4 principal quadrants of the periapillary sclera and 16 regions of the mid-posterior tissue.
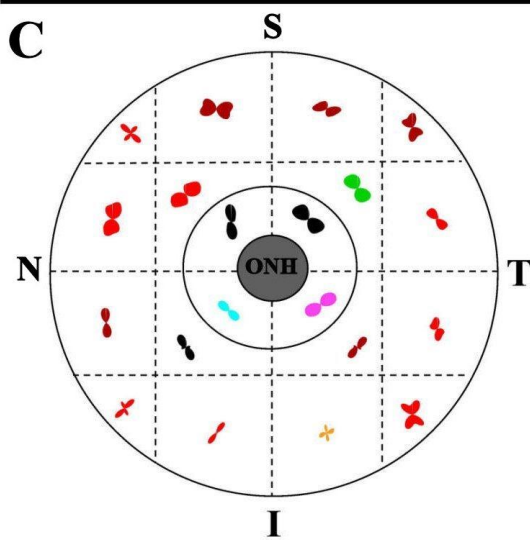
A

Left eye

S

N   ONH   T

I

More aligned collagen

| /10 |
| /7 |
| /6 |
| /5 |
| /4 |
| /3 |
| /2 |
| /1 |

B

S

N   ONH   T
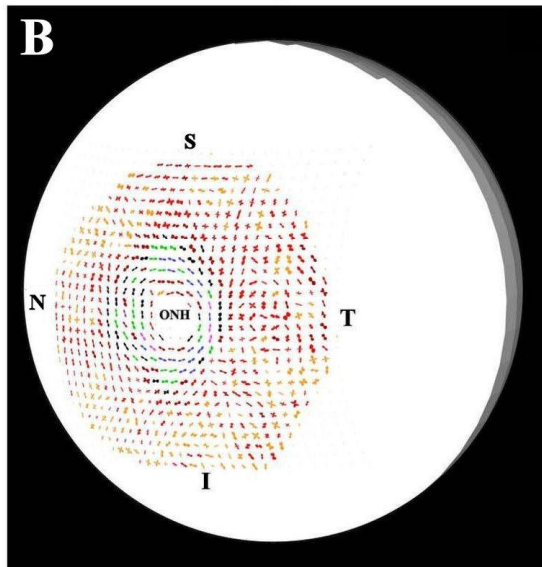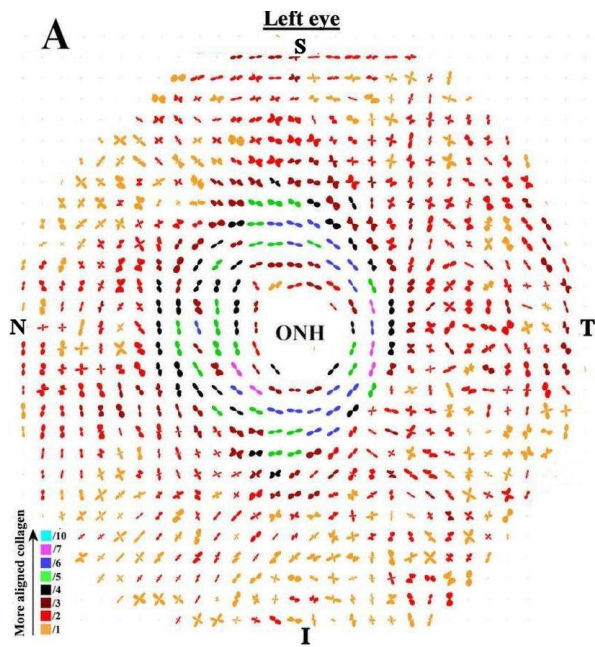
I

C

S

N   ONH   T

I

Figure S2: (A) Polar vector map of preferential collagen fiber orientation across a 15mm diameter posterior scleral specimen (g2l) from the left eye of a second glaucoma human donor, sampled at 0.5mm intervals, and viewed from the posterior side. The map has been mirror-flipped horizontally to enable direct comparison with right and left eyes in the main manuscript. **(B)** Polar vector plots mapped onto 3D posterior eye model. **(C)** Regional map showing average polar plots within the 4 principal quadrants of the periapillary sclera and 16 regions of the mid-posterior tissue.
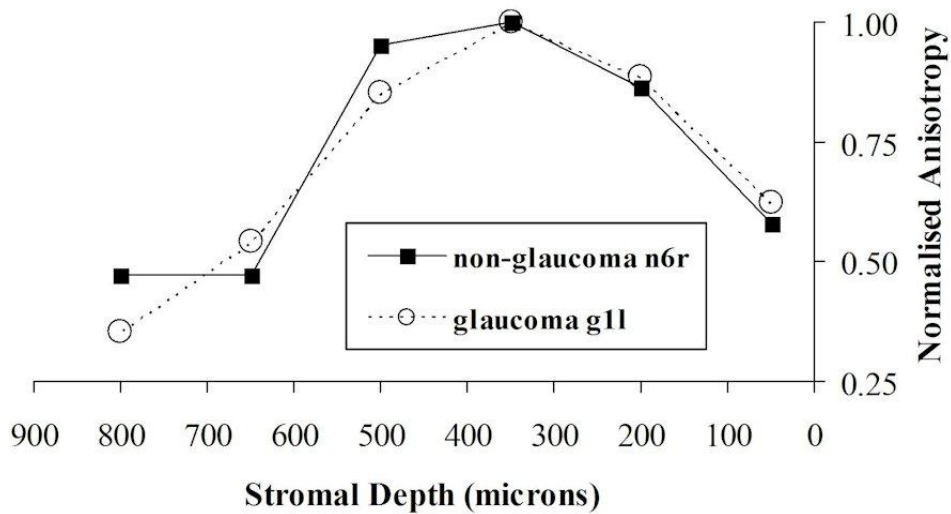

Figure S3: Normalised fiber anisotropy as a function of stromal depth for non-glaucoma specimen n6r and glaucoma specimen g1l. The values displayed are averages of four peripapillary scleral regions, corresponding to the locations shown in Figs. 7S and 8S in the main manuscript.