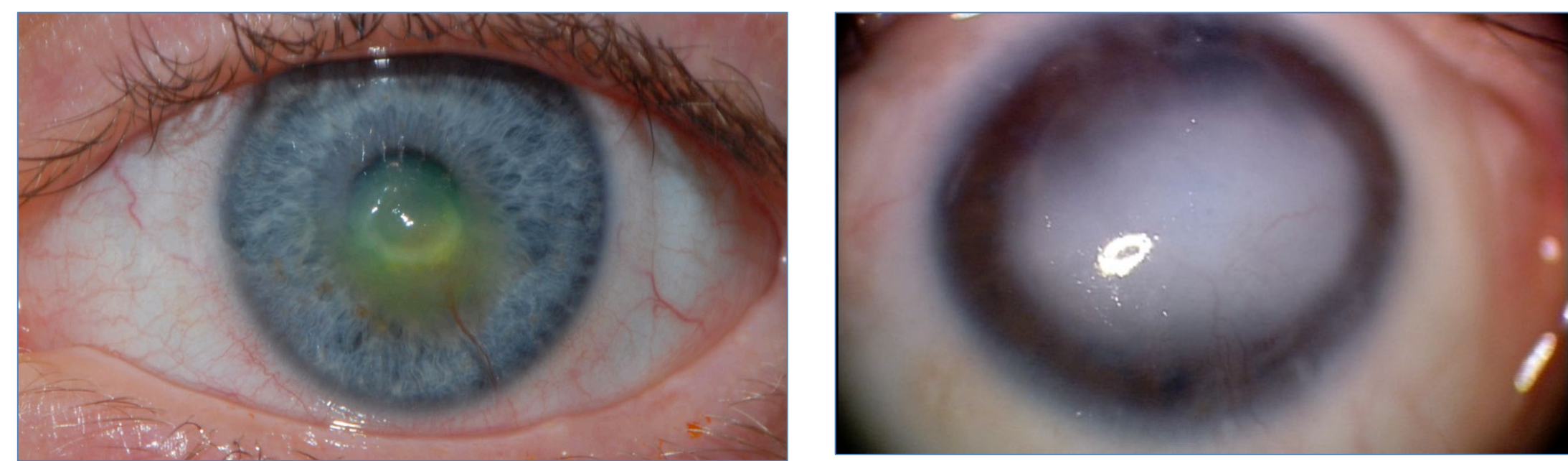


## BACKGROUND

The cornea is one of the most densely innervated tissues of the body. Corneal sensory nerves:

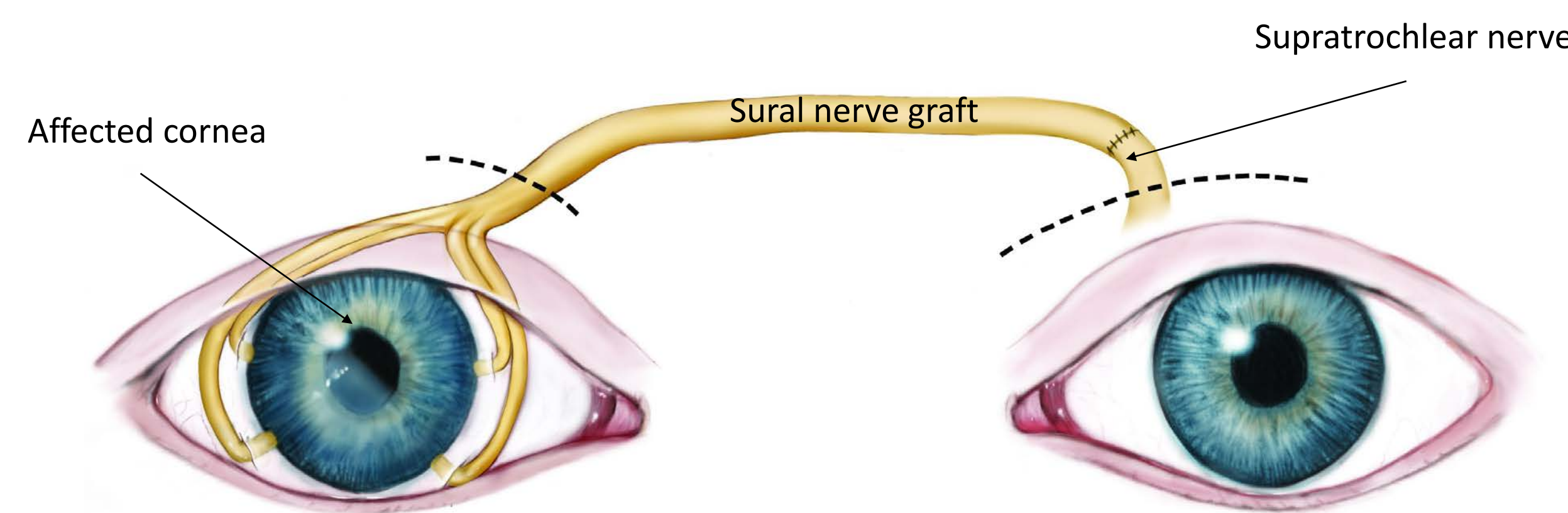
- Protect the eye and prevent corneal scarring
- Secrete trophic factors that maintain and heal the corneal epithelium [1]

Neurotrophic keratopathy develops in the reduction and/or absence of corneal sensory innervation resulting in epithelial thinning, ulceration and scarring.



**Fig 1.** (L) corneal epithelial ulceration with fluorescein staining. (R) corneal scarring

Corneal neurotization restores corneal innervation and sensation in patients with neurotrophic keratopathy.

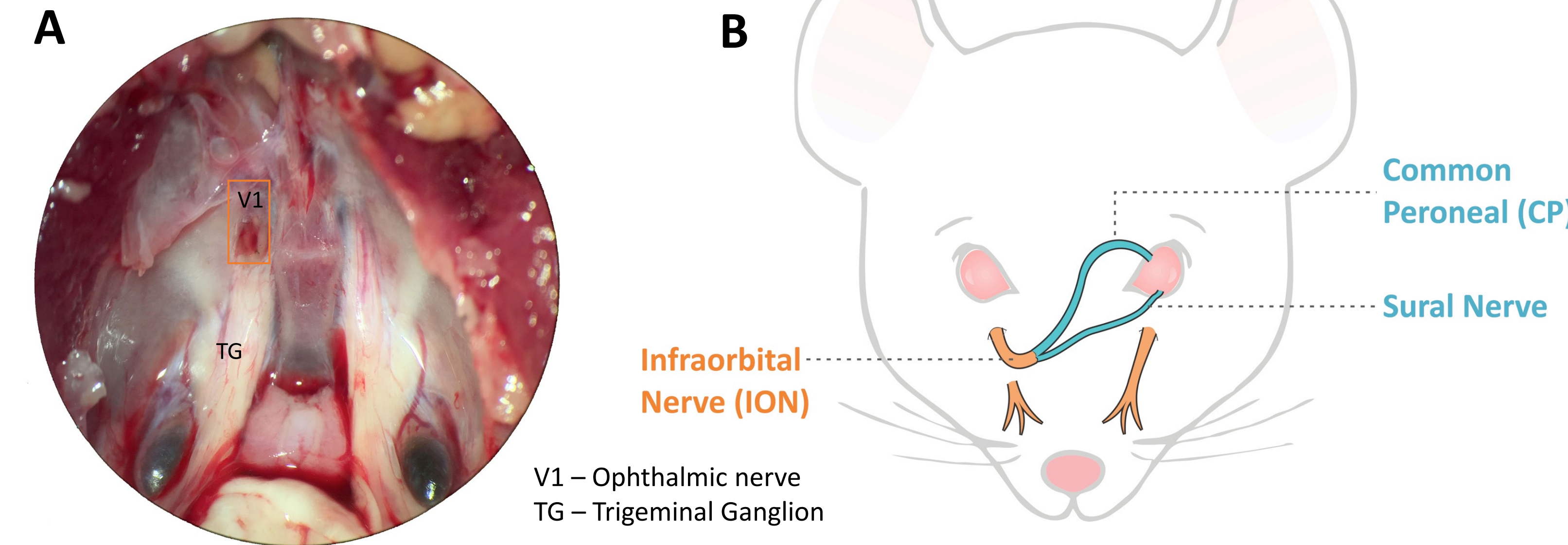


**Fig 2.** Sural nerve autograft attached to supratrochlear nerve. Axons from graft guided and sutured to contralateral affected cornea. [2,3,4]

## REASERCH QUESTION

In a neurotrophic keratopathy, does corneal neurotization restore the epithelium to normal thickness?

## METHODS



**Fig 3.** **A,** Corneal denervation achieved by stereotactic ablation of V1. **B,** Corneal neurotization achieved by coapting CP and sural nerves to Infraorbital nerve and guiding nerves to contralateral affected eye [5]

Affected corneas (n=5 per group) were harvested 4 weeks after corneal denervation, with and without treatment with corneal neurotization. Three 10 μm cross-sections from each cornea were analyzed, and each section was stained with hematoxylin and eosin. Sections were imaged with bright-field microscopy at 200X magnification, and central corneal epithelial and stromal thicknesses were assessed in ImagePro. Mean thicknesses were compared using the Kruskal-Wallis test and unpaired T-tests.

## RESULTS



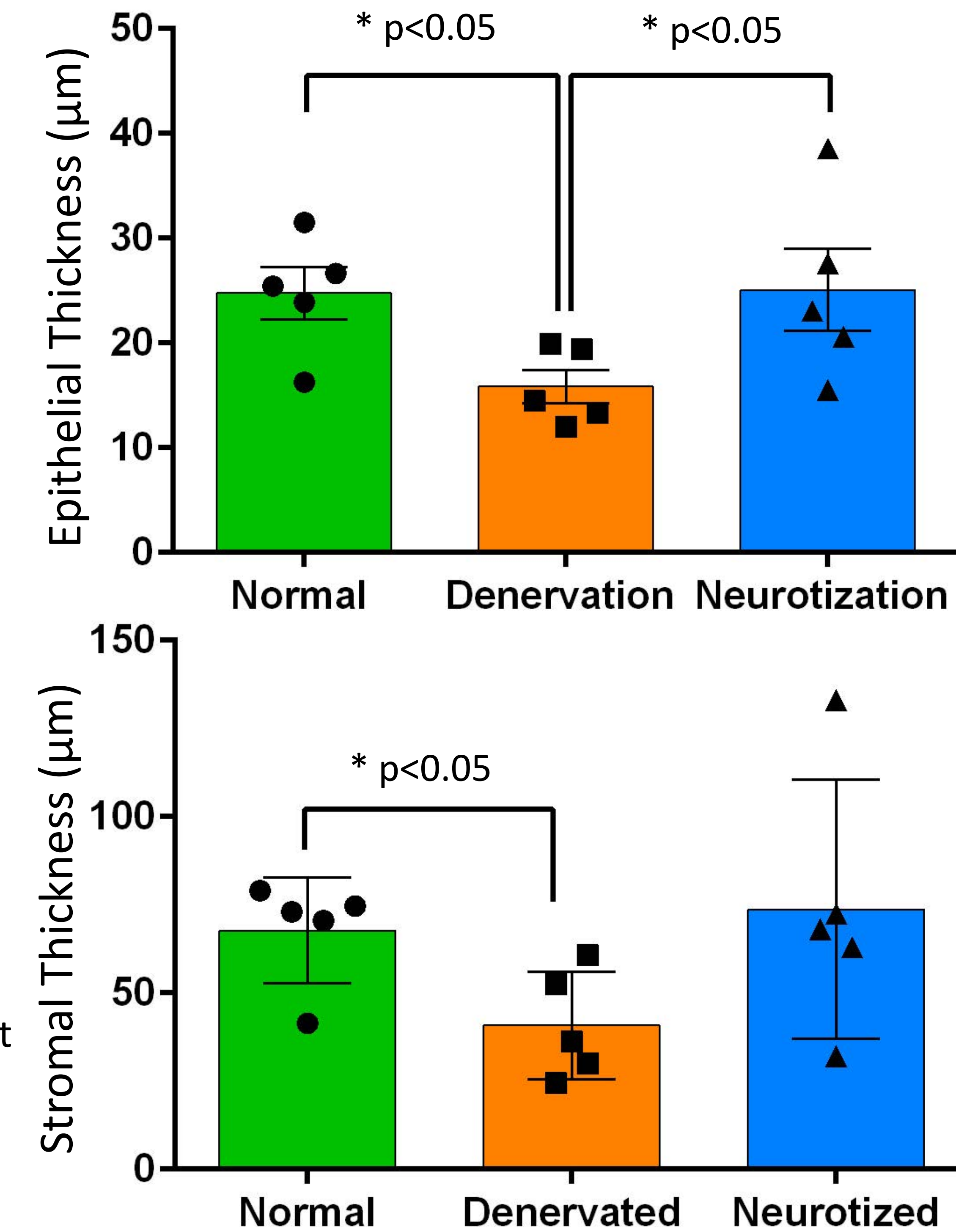
Normal

Corneal Denervation

Corneal Neurotization

**Fig 4.** 100X magnification of central cornea from the three experimental groups, illustrating the 5 corneal layers: I, epithelium, II Bowman's layer, III Stroma, IV, Descmet's membrane, V Endothelium

## RESULTS



**Fig 5.** Corneal neurotization restores central epithelial but not stromal thickness to normal

## CONCLUSIONS

Corneal neurotization

- Protects against central epithelial thinning in the neurotrophic keratopathic cornea, but not against stromal thinning

This suggests the reinnervating axons of the inserted grafts restore corneal epithelial integrity.

We are currently investigating the mechanisms underlying the observed improved corneal health following corneal neurotization

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