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Poster Presentation P10

THE EFFECTS OF THYROID HORMONE ON CORNEAL INNERVATION

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The cornea, the transparent tissue at the front of the eye, is the most densely innervated tissue on the surface of the body. The dense network of corneal nerves is crucial for the transmission of noxious environmental stimuli, thus playing a vital protective role in maintaining vision and eye health. Unfortunately, corneal nerves are often damaged following injury or modern corrective surgeries such as LASIK and cornea transplantation. Inexplicably, corneal nerves are very slow to repair or fail to do in some patients. Gaining a deeper understanding of the mechanisms that promote nerve growth into the cornea during embryonic development will enable scientists to design therapies aimed at enhancing nerve regeneration following cornea injury or repair. Among the molecules shown to influence the process of cornea innervation is thyroid hormone (T4). T4 is a major regulator of metabolism in adults, though its role in nerve development and regeneration is less clear. Previous work has shown that exposing chick embryos to T4 leads to increased penetration rates and branching of corneal nerves, such that a greater proportion of the cornea is innervated at earlier timepoints. These findings raise the intriguing possibility that T4 may be therapeutically useful in corneal nerves to regenerate at a faster rate following injury. Despite this, the mechanism of T4 stimulation of corneal nerve innervation is unknown. Herein, we address whether T4 directly (by action on nerves) or indirectly (by changing the biology of the cornea) regulates the developmental growth rate of nerves by monitoring how nerves respond to T4 treatments in living chick embryos.