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Hyaluronic Acid-Releasing Ocular Insert with Vitamin B12 for Dry Eyes and Post-Lasik Therapy

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Post-Lasik dry eye syndrome is a frequent complication caused by corneal nerve disruption and reduced tear production, which results in delayed corneal nerve healing, discomfort and impaired vision. Current ocular inserts concentrate mainly on dryness and hydration but fails to address nerve regeneration. To address this, we developed EYE QUENCH, a novel sustained-release hydrogel ocular insert composed of polyvinyl alcohol and chitosan, incorporating hyaluronic acid and vitamin B12. Hyaluronic acid plays a vital role in hydration, lubrication and epithelial healing, while vitamin B12 supports corneal nerve regeneration and acts as an antioxidant. Sustained release of both vitamin B12 and hyaluronic acid provides prolonged therapeutic action compared to conventional eye drops. The dual-therapy design addresses both dryness and irritation and underlying nerve damage which helps in offering comprehensive recovery support. The insert is fabricated using a solvent casting method which ensures transparency and flexibility. The resulting insert demonstrated strong mucoadhesion, controlled release potential, and improved biocompatibility. The dual-delivery system has a potential to improve post-Lasik outcomes, chronic dry eye management and ocular surface healing, while reducing dependency on repeated eye drop administration. This innovation highlights a new direction in biopolymer-based ocular drug delivery system.

Keywords: Ocular insert, post-Lasik dry eye, Dual-Delivery system and Corneal nerve regeneration

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