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Review

Nanomedicine Approaches for Corneal Diseases

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Abstract: Corneal diseases are the third leading cause of blindness globally. Topical nonsteroidal anti-inflammatory drugs (NSAIDs), steroids, antibiotics and tissue transplantation are currently used to treat corneal pathological conditions. However, barrier properties of the ocular surface necessitate high concentration of the drugs applied in the eye repeatedly. This often results in poor efficacy and several side-effects. Nanoparticle-based molecular medicine seeks to overcome these limitations by enhancing the permeability and pharmacological properties of the drugs. The promise of nanomedicine approaches for treating corneal defects and restoring vision without side effects in preclinical animal studies has been demonstrated. Numerous polymeric, metallic and hybrid nanoparticles capable of transporting genes into desired corneal cells to intercept pathologic pathways and processes leading to blindness have been identified. This review provides an overview of corneal diseases, nanovector properties and their applications in drug-delivery and corneal disease management.

Keywords: corneal diseases; infection; scarring; fibrosis; neovascularization; nanoparticles; nanomedicine; nanomaterials; nanodelivery

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