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Paper Title: Physical and Biological Investigation of Injectable Thai Silk Fibroin/Hyaluronic Acid Hydrogel Sustained-Releasing Dexamethasone for Glaucoma Treatment

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Abstract

Failure of glaucoma surgery occurred due to fibrosis formation. To prevent fibrosis formation, an anti-inflammation agent, such as dexamethasone (DEX), was utilized to inhibit inflammation during the wound healing process, leading to fibrosis reduction. In the present study, DEX is loaded into an ultrasonication-induced silk fibroin/hyaluronic acid (SF/HA) hydrogel as a sustained-release drug delivery system. The SF/HA hydrogel can be fabricated using ultrasonic induction resulting to homogeneous gel within 1 day after incubation at 37°C. The SF/HA hydrogel showed non-swelling ability, released DEX up to 60% along 30 days of incubation in balanced salt solution, and non-cytotoxic to fibroblasts. However, the gelation, swelling ability, release profile of DEX, and cytotoxicity of the SF/HA hydrogels are independent of their concentrations and SF/HA ratios. Injectability test confirmed that the hydrogel could be easily injected through the needle, particularly for hydrogel containing less concentration and higher HA content. As aforementioned, the ultrasonication-induced SF/HA hydrogel could be utilized as an injected carrier of DEX for incorporation with postoperative glaucoma surgery to reduce inflammation and fibrosis formation.