Silk Fibroin-Coated Drug-Eluting Sutures

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Following surgery, dogs experience irritation on the skin around the surgical site due to pain, histamines, and the protein IL-31. These factors cause dogs to lick or scratch at their sutures, thereby compromising wound healing and suture integrity. Sutures coated in Apoquel, an IL-31 suppressing medication, and bupivacaine liposome injectable suspension (BLIS), a long release local anesthetic, have the potential to minimize irritation surrounding the surgical site. To investigate differences in release times between the two drugs, fluorescein and fluorescein disodium were used as model chemicals for Apoquel and BLIS as they are similar in solubility, molecular weight, were available, and could be analyzed using a FilterMax F5 microplate reader. Three dip trials were conducted for fluorescein and fluorescein disodium, both in 13% silk fibroin, and half of each dip trial was annealed with ethanol. All coated suture samples were placed in 500 µL of phosphate-buffered saline (PBS), and at eight time points over a period of seven hours, 200 µL samples were assayed and analyzed with a FilterMax F5 microplate reader. The results demonstrated a prolonged release of both fluorescein and fluorescein disodium over a period of five-and-a-half to seven hours for triple-coated suture samples. This experiment supports the potential for sutures coated in a silk fibroin and drug solution to have a slow release over time and could prove beneficial in minimizing surgical site irritation. However, more research is needed utilizing the intended drugs and conducting in vivo testing to evaluate efficacy in targeting surgical site irritation.

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