Silk Fibroin-Coated Drug-Eluting Sutures

McKay, Mila (School: Hellgate High School)

Following surgery, dogs generally experience irritation on the skin around the surgical site due to pain, histamines, and the protein IL-31 (Blue Cross, 2020)(Xu, et al., 2020)(Zimlich, 2021). While sutures are important for promoting wound healing, animals often compromise the integrity of stitches due to their discomfort. Dogs will attempt to minimize this pain by licking since those particular nerves also block feelings of irritation (Blue Cross, 2020). The purpose of this project was to develop a new type of stitch material which minimizes surgical site pain and/or itchiness. In order to test our hypothesis, and as a proof of concept for this experiment, we used fluorescein and fluorescein disodium as model drugs for Apoquel and Bupivacaine, as they are similar in solubility and molecular weight to the actual drugs that would be used. Three different dip trials were set up for fluorescein and fluorescein disodium, with half of each dip trial being cross linked with ethanol. All samples were placed in 500 microliters of PBS. One hundred microliter samples were assayed after specified time intervals and the drug release was monitored by measuring the A495 nm values for each sample with a FilterMax F5 microplate reader. This experiment supports that there is potential for coated sutures cross linked with ethanol that may decrease or even eliminate surgical site irritation.

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