Summer Student Research Program
Project Description

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PROJECT TITLE (200 Characters max):

Effect of topical Vanco upon diabetic bone healing

HYPOTHESIS:

Purpose: We aim to identify the effects of locally administered vancomycin powder on fracture healing in Type 1 DM rats and its dose-response in vitro.

Hypothesis: Local low doses of vancomycin does not significantly impair diabetic fracture healing, but prolonged administration at high doses has the potential to inhibit bone formation in vitro.

PROJECT DESCRIPTION **(Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)**

Standard Vancomycin application is at 1-2 grams for infusion pumps. Prophylactic administration of topical powdered vancomycin at the surgical site has become increasingly common, especially in the setting of diabetes.
A median dose of 1.5 grams to the surgical site of an average person weighing 70 kg. is 21.42 mg/kg. We chose an in vivo dose of 25mg/kg. Current studies evaluating the impact of this treatment on bone healing are limited. To our knowledge this is the first study investigating this treatment in diabetic animals.
IN VIVO
Male diabetic BB Wistar rats using Einhorn fracture model
Longitudinal incision and administration of 25 mg/kg vancomycin powder at fracture site
Day 42 testing:
Mechanical torsional testing
Radiographic scoring
μ-CT analysis
IN VITRO
Bone marrow cells plated (5800/cm2) with beta glycerol phosphate/ascorbic acid after 4 days and varying concentrations of vancomycin:
0 μg/mL
50 μg/mL
500 μg/mL
Staining:
ALP-Days 7/14(early osteogenesis)
Alizarin red s-Day 28(late mineralization)

SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:

Topical Vancomycin Does Not Impair Long-term Fracture Healing in Diabetic Rats and Dose-dependently Inhibits Mineralized Nodule Formation OTS 2021

THIS PROJECT IS: ☐ **Clinical** x☐ **Laboratory** ☐ **Behavioral** ☐ **Other**

THIS PROJECT IS CANCER-RELATED☐**NA**
Please explain Cancer relevance

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THIS PROJECT IS HEART, LUNG & BLOOD- RELATED ☐ NA
Please explain Heart, Lung, Blood relevance

THIS PROJECT INVOLVE RADIOISOTOPES? ☐ NA

THIS PROJECT INVOLVES THE USE OF ANIMALS ☐ YES
PENDING ☐ APPROVED ☐ x IACUC PROTOCOL # 17057

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS? ☐ NA
PENDING ☐ APPROVED ☐ IRB PROTOCOL # M

THIS PROJECT IS SUITABLE FOR:

UNDERGRADUATE STUDENTS	☐	ENTERING FRESHMAN	☐
SOPHMORES	☐	ALL STUDENTS	☐x

THIS PROJECT IS WORK-STUDY: Yes ☐ or No ☐x

THIS PROJECT WILL BE POSTED DURING ACADEMIC YEAR
FOR INTERESTED VOLUNTEERS: Yes ☐x or No ☐

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?

DM animal care
Surgery femur fracture model
Cell culturing
Mechanical testing

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