The Development of an Effective Antibiotic Treatment To Limit the Bacterial Growth of Staphylococcus epidermidis on Total Joint Arthroplasties

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This project seeks to develop an effective antibiotic treatment to reduce Staphylococcus epidermidis growth on arthroplasties due to periprosthetic joint infection (PJI). Antibacterial substances Calcium sulfate, Sodium citrate, and Ylang Ylang blend were tested individually, then combined. Testing was conducted in vitro by mixing substances with agar prior to pouring plates. The plates were sealed and incubated for 72 hours. The three amounts tested for Calcium sulfate and Sodium citrate were 0.2, 0.5, and 0.8 grams and the three amounts tested for Ylang Ylang were used 2, 4, and 6 milliliters. The data was analyzed by photographing the sealed dish, uploading the image to Photopea, overlaying a grid at 50.00% zoom, and then counting how many grid boxes contained bacterial growth. Data collected found Sodium citrate and Ylang Ylang had a significant impact on bacterial growth individually, but the combinations (Calcium sulfate/Ylang Ylang, Sodium citrate/Ylang Ylang, and Calcium sulfate/Sodium citrate) all yielded insignificant results. A data outlier in method two's control skewed analysis and was removed. When the outlier was not considered, the Sodium citrate/Ylang Ylang and Calcium sulfate/Ylang Ylang combinations significantly reduced S. epidermidis growth. Both hypotheses one and two were rejected.

Awards Won:
Fourth Award of $500