The Effects of Cholecalciferol on Survivability of Methicillin-resistant Staphylococcus aureus: Combined Treatment

Bryant, Micaela

Methicillin-resistant Staphylococcus aureus (MRSA) spreads infection throughout densely populated livestock operations and healthcare facilities, assessing $19.7B on US society annually. Choleclaciferol (vitamin D3) regulates the immune system, stimulating production of antimicrobial peptides. This project is result of in vitro experimentation on MRSA using cholecalciferol before and during antibiotic testing to determine if cholecalciferol can weaken MRSA, allowing effective standard antibiotic treatment. In part 1, MRSA was cultured on cholecalciferol-infused agar, and cefoxitin disc was placed on agar. In part 2, MRSA control was cultured in cholecalciferol-infused broth, then subcultured on agar. Cefoxitin discs were applied to agar. Growth inhibition zones were compared. Inhibition zones increased from 0mm to 11.6mm on cholecalciferol-infused agar. Inhibition zones increased from 0mm to 14.5mm in subcultures for cholecalciferol-infused broth. Concurrent application showed a variance of 36.25 for 8,000 IU and 29.31 for 10,000 IU, p-value =7.81x10-10. Consecutive application showed a variance of 8.05 for 8,000 IU, and 16.37 for 10,000 IU, p-value=7.5x10-25. Cholecalciferol weakened MRSA's antibiotic resistance in both concurrent and consecutive applications, with consecutive application most effective. Cholecalciferol may prove synergistically useful, both in pre-infection regimen and concurrently with antibiotic treatment. Cholecalciferol therapy may reduce antibiotic use, allowing standard antibiotic use against MRSA infections.

Awards Won: