A Novel Method to Induce and Upregulate the Production of Stable Antistaphylococcal Compounds via the Combined-Cultivation of S. salivarius and Streptomycetes

Jain, Arjun

The current rise of multi-resistant bacterial strains has required increased development and production of new antimicrobial compounds. Research into the “cryptic biosynthetic pathways” of antibiotic-producing soil bacteria of the Streptomyces genus has shown that the production of natural antibiotics is dependent on environmental factors and the presence of microorganisms. This experiment proposes a novel combined-cultivation assay to test the effects of united growth of antibiotic-producing bacteria. The hypothesis is that the mutual growth will induce production of greater quantities of antimicrobial secondary metabolites against a standard S. aureus strain. This experiment also details a soil bacteria isolation protocol which can be used to identify new antibiotic-producing bacteria. The combined-cultivation procedure involved a bacteria of the Streptomyces genus and Streptococcus salivarius, both of which were isolated directly from soil samples. S. salivarius independently produced a previously undiscovered compound which was highly effective at inhibiting the growth of S. aureus. Research shows that this new compound may target the lipid-II molecule in Staphylococcus, which would suggest an ability to disable MRSA growth. The combined-cultivation resulted in the production of antibiotics which created a zone of inhibition 322.58% larger than those produced individually. This suggests that this novel and reproducible method can be used to develop larger and more potent quantities of antibiotics which MRSA cannot develop resistance to. This research opens a path to understanding the production and effects of antibiotics in relation to multiple bacteria, which could allow for the development of specific compounds to target resistant strains.

Awards Won:

Third Award of $1,000