Analysis of the Antimicrobial Efficacies and Structural Characteristics of Fractional Components of Selected Algal Extracts

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Antibiotic resistance constitutes one of the world's greatest public health issues. Through natural selection, bacteria have developed mechanisms that confer this resistance - creating a pressing need for the development and discovery of new antimicrobial chemotherapeutic agents. This novel investigation seeks to examine the potential of fractional components of selected algal extracts as antimicrobial chemotherapeutic agents. Initially, ten 10% algal extracts - derived from the species Chondrus crispus and Laminaria digitata - were screened for antimicrobial properties; extracts were examined for antibiotic resistance modifying, biofilm formation inhibitory, and planktonic cell growth inhibitory properties. Selected pathogenic bacteria (community-associated and hospital-acquired methicillin-resistant Staphylococcus aureus and Pseudomonas aeruginosa) and two non-pathogenic bacterial model organisms were additionally tested for sensitivity to the extracts. The four extracts with the most suggested antimicrobial activity were subjected to further analysis. Extracts were examined for the number and purity of contained compounds using analytic chromatographic techniques, and extracts were subsequently fractionated using reverse-phase chromatography. Antimicrobial analysis of the 52 obtained fractions suggests that 31 fractions exhibited planktonic cell growth inhibition. The two fractions with the highest suggested amount of planktonic cell growth inhibition were analyzed for their compounds' structural characteristics via direct infusion mass spectrometry and gas chromatography-mass spectrometry. Among the identified compounds, squalene - isolated from methanolic C. crispus extract - demonstrates the most potential as an antimicrobial chemotherapeutic agent.

Awards Won:
Second Award of $2,000