Discovery of Novel Natural Products for Treatment of Drug Resistant Microbial Pathogens

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Introduction

The field of natural products chemistry utilizes nature for medicinal purposes. The term natural product represents compounds derived from living organisms such as microorganisms, plants, invertebrates and vertebrates. Natural products are almost exclusively secondary metabolites, compounds that play ecologically important roles in how the living organism deals with their surroundings. Historically, natural products have played a vital role in medicine, providing many antitumor, antiviral, and antibacterial remedies. Many revolutionary and novel drugs have been developed from natural products including morphine, aspirin, quinine, paclitaxel, and, most notably, penicillin.

Methods and Materials

The Streptomyces strain CES088 was cultured in 250mL of liquid medium and incubated at 30 °C for seven days. The cultures were centrifuged to separate the mycelia (cells) from the supernatant and both samples were extracted with methanol and ethyl acetate EtOAc, respectively. The extracts were dried using a rotovap, reconstituted in dimethylsulfoxide at 10mg/mL and tested against A. baumannii using a standard broth dilution assay.

Results

To successfully isolate and elucidate the structure of the active components from strain CES088, if a new compound with unique biological activity is discovered, it could be studied and potentially used to develop novel antibiotics for important microbial pathogens.

Conclusions and Future Directions

Mass spectrometry was employed to obtain a mass of fraction 1011301. The fraction was found to fly in APCI-Positive mode, and an internal standard was utilized to find an exact mass of 466.2154. Three possible formulas were found to be within 5 ppm of the exact mass found; they are as follows: C_{19}H_{20}N_{4}, C_{17}H_{18}O_{6}, and C_{14}H_{20}NO. However, through NMR analysis, no formula seemed logically correlated to the fraction. Further purification and structure elucidation will be necessary to determine the structure. If it is a novel natural product, it could be studied and potentially used to develop novel antibiotics for important microbial pathogens. However, if the active compound is a previously identified natural product, the project may evolve into studies of the unique mechanism of action against A. baumannii.

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References

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