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Exploring the Antimicrobial and Anticancer Potential of a Bioactive Peptide from *T. radiatus*: A Comprehensive Study

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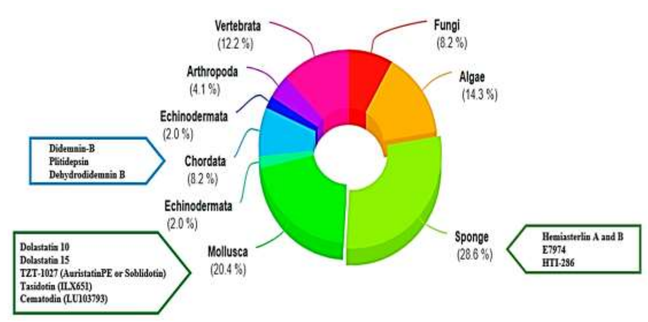
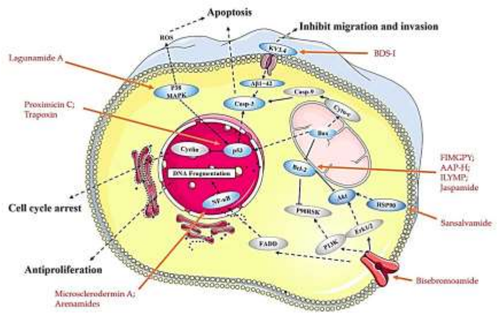
INTRODUCTION & AIM

INTRODUCTION:

The burgeoning field of therapeutic peptides offers a promising avenue for advancing anti-cancer strategies. Among these peptides, three distinct categories have emerged: antimicrobial/pore-forming peptides, cell-permeable peptides, and tumor-targeting peptides. This classification underscores the diverse cellular targets and applications of these peptides, particularly in cancer therapy. Notably, antimicrobial/pore-forming peptides (AMPs) represent a subset with natural origins in various organisms, pivotal to innate immune defenses.



Marine-derived products and anticancer peptides in clinical trials



Mechanisms of action for the some marine anticancer peptides

Source: Zhang et al. (2021) Mar. Drugs 19(2), 115. DOI: 10.3390/md19020115

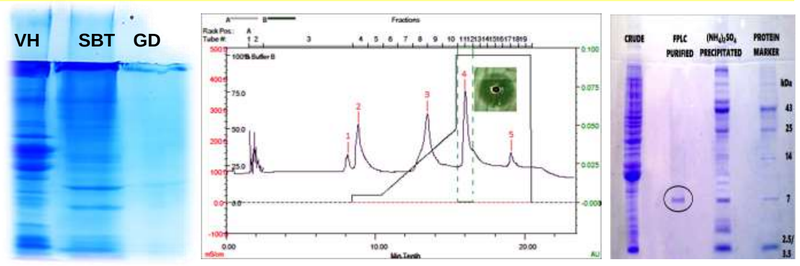
AIM:

This study aims to explore the potential of a bioactive peptide (PAP) purified from the soft body tissue of the marine gastropod *T. radiatus*. Through a bioassay-guided fractionation approach, the multifaceted properties of PAP are elucidated, employing sequential techniques including ammonium sulfate precipitation, cation exchange chromatography, and gel filtration chromatography. The primary focus lies on assessing PAP's antimicrobial efficacy against a spectrum of bacteria and its selectivity against cancer cell lines, while exploring its stability and mechanism of action. Additionally, this study endeavors to determine PAP's amino acid sequence and structural characteristics, shedding light on its potential as a dual-action agent against antimicrobial resistance and cancer progression.

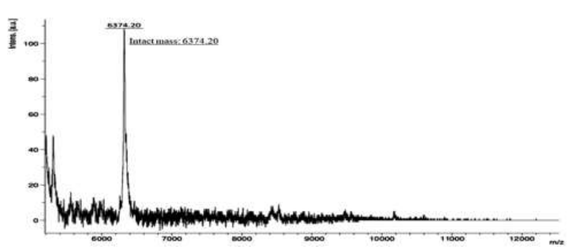
METHOD

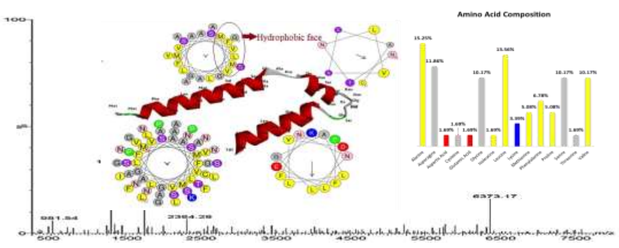
RESULTS & DISCUSSION

FRACTIONATION, PURIFICATION AND STRUCTURAL INSIGHTS OF ANTIMICROBIAL PEPTIDE

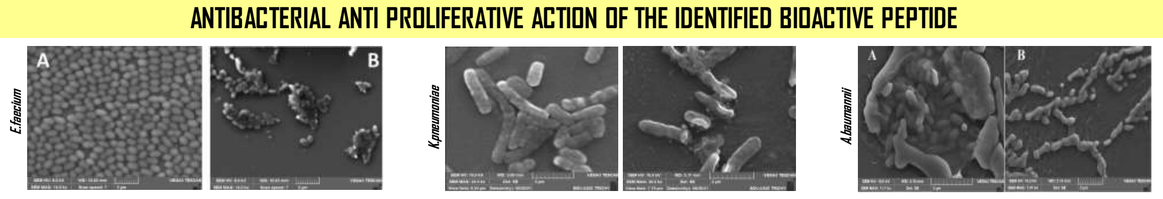


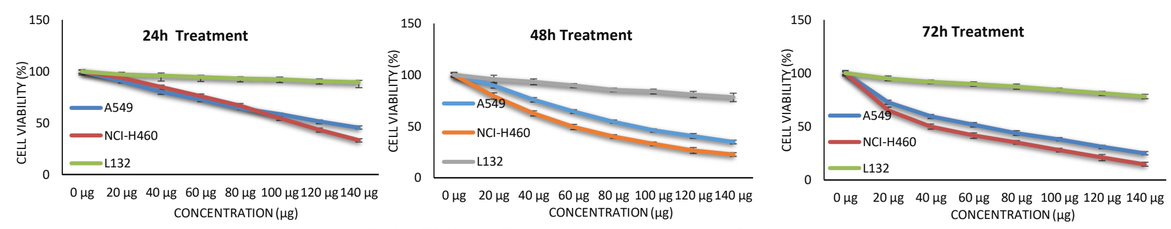
Chromatographic Profile of *T.radiatus* Protein Extract

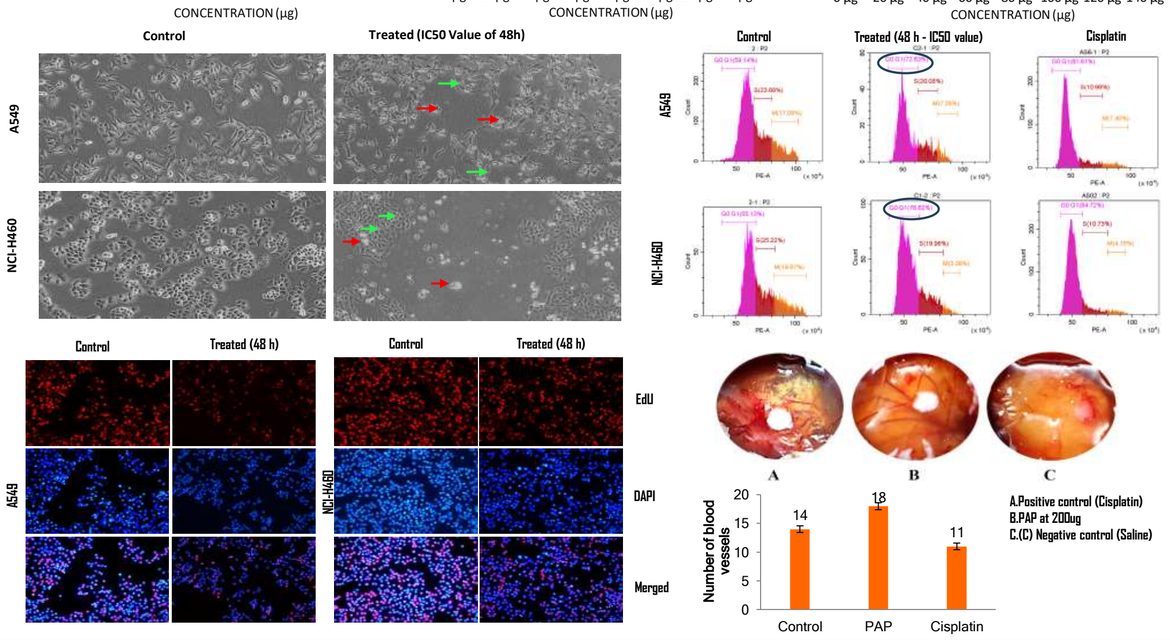




ANTIBACTERIAL ANTI PROLIFERATIVE ACTION OF THE IDENTIFIED BIOACTIVE PEPTIDE







CONCLUSION

***In-Vitro* Antibacterial Susceptibility:** The purified antibacterial peptide exhibited higher activity against Gram-negative bacteria, especially E. faecium, K. pneumoniae, and A. baumannii. The antibacterial activity increased with each purification step.

***In-vitro* Bacteriostatic, cidal dose & scavenging ability:** PAP displayed potent activity against ESKAPE pathogens and had superior radical scavenging ability compared to ascorbic acid.

Hemolytic Potential: Minimal hemolysis observed against human erythrocytes up to concentrations of 2xMBC.

Growth Inhibition and Viability: PAP inhibited two lung carcinoma cell lines but was less toxic to normal L132 cells, indicating potential anticancer properties.

Cell Cycle Analysis: PAP caused cell cycle arrest in the G0/G1 phase in the studied carcinoma cells.

Effect of PAP on Angiogenesis: Promoted embryonic blood vessel growth.

FUTURE WORK / REFERENCES

Future works:

1. Elucidate molecular mechanisms and optimize targeting.
2. Develop innovative delivery systems for enhanced efficacy.
3. Advance preclinical studies for clinical translation.

References:

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