REGIONAL CENTRE FOR BIOTECHNOLOGY

Seminar series

Future of Antibiotics: Getting Worse or Receiving Better Therapy?

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Seminar Room

Abstract

Recently, microbial infections are raising a serious public health problem across the World. The indiscriminate and inappropriate uses of antibiotics leading to the rapid emergence of multi-drug-resistant(MDR) pathogens. It is imperative to develop new classes of antibiotics with different actions excluding conventional antibiotics. Uses of antimicrobial peptide(AMPs) is an alternative strategy with their tunable activity by varying composition, amphipathicity and charge. We have made several attempts to identify the naturally occurring AMPs, and design a tailor-made peptide based structural analysis to improve the activity. Attempts are also made to develop self-assembled-AMPs-based nanostructures which showed the enhanced antimicrobial activity with reduced toxicity. The structure-function relationship of several AMPs and heterocyclic complexes are studied at *in vtro* to *ex-vivo* model, showed an unusual mechanism of action.

Long term application of antibiotics induces secondary side effects by generating oxidative stress and DNA damage. We have studied in detail the involvement of DNA base excision repair proteins, NEIL2, and PNKP to remove the oxidized bases from DNA during replication or transcription. Our data provided the clue, how DNA repair therapy could be useful in post antibiotic therapy. Genomics and proteomics analyses revealed the involvement of efflux pump genes mutation and deregulation of protein expression, which is crucial in MDR strains. In near future, bacterial mutation arc may also reduce the efficiency of recently developed drugs. Thus, strategies like continuous designing of new antibiotics, effective efflux pump inhibitors and details study on genetic basis of antibiotic resistance might be the future answer to fight against MDR pathogens.