

Antibiotic Resistance Problem: Grim Reality and the Battle

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Antibiotic resistance is growing at an alarming rate in all parts of the world. Treatment for common infectious diseases by antibiotics is severely restricted due to the emergence of new mechanism of resistance orchestrated by the bacterial machinery. Moreover, the rapid spreading of the antibiotic-resistant bacterial infections via plasmid-encoded resistant genes is cause of serious concern. A growing list of infections – such as pneumonia, tuberculosis, septicaemia and many other diseases are becoming harder to treat as antibiotics become less effective or just fail to act. The misuse or over-use of antibiotics has made the situation even worse. Urgent action and extensive research supported by massive funding are needed; otherwise, we are heading towards a post-antibiotic era (similar to the pre-antibiotic stage), in which common infections and minor injuries can once again kill. This lecture will highlight the issues related to antibiotic discovery, their resistance mechanisms¹ and possible strategies to identify^{2,3} and shut down the activity of proteins involved in conferring resistance.

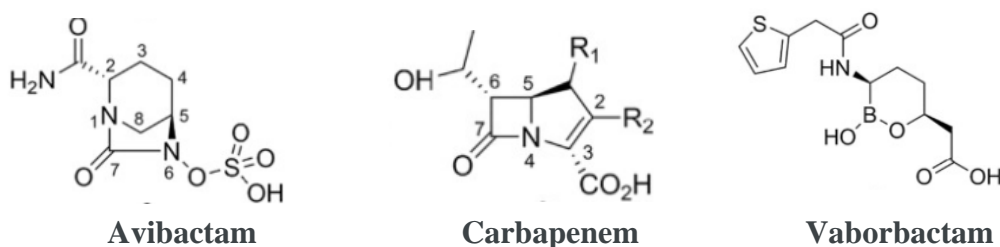


Figure 1: Representative structures of some newer antibiotics

References and Notes:

1. Nathan, C. Resisting antimicrobial resistance. *Nat Rev Microbiol* **2020**, *18*, 259–260.
2. Singha, M.; Kumar, G.; Jain, D.; Kumar N. G.; Ray, D.; Ghosh, A. S.; Basak, A. Rapid Fluorescent-Based Detection of New Delhi Metallo- β -Lactamases by Photo-Cross-Linking Using Conjugates of Azidonaphthalimide and Zinc(II)-Chelating Motifs *ACS Omega* **2019**, *4*, 10891-10898
3. Singha, M.; Roy, S.; Pandey, S. D.; Bag, S. S.; Bhattacharya.; Das, M.; Ghosh, A. S.; Ray, D.; and Basak, A Use of azidonaphthalimide carboxylic acids as fluorescent templates with a built-in photoreactive group and a flexible linker simplifies protein labeling studies: applications in selective tagging of HCAII and penicillin binding proteins *Chemical Communications* **2017**, *53*, 13015-13018.

Bio-Sketch of Speaker

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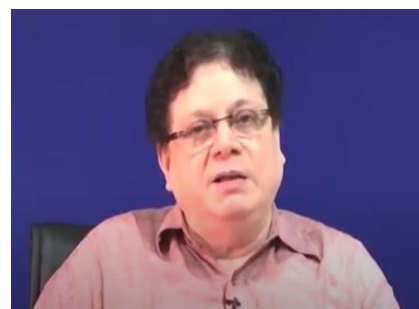
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AWARDS AND DISTINCTIONS:

JC Bose National Fellow (Dec 2011-April 2020)

Fellow of Indian Academy of Sciences, Bangalore.

Fellow of Indian National Science Academy

Fellow of National Academy of Sciences

Fellow of Royal Society of Chemistry

Editorial Advisory Board Member, Chemical Communications (2006-2009)

Leverhulme Visiting Professor, Oxford University, 2011-2012.

Pfizer award, IISc, Bangalore, 2016

JN Mukherjee Endowment lecture (Indian Chemical Society) 2017

PROFESSOR SUBRAMANIA RANGANATHAN MEMORIAL MEDAL (INSA) (2021)

Research Interest

- Ene-diyne: Synthesis, Reactivity and asDNA Cleaving Agents.
- Synthetic potential of Diradical Generating Processes
- Affinity Guided Drug Target Identification
- Proteomics/Metabolomic/ protein capture
- Label assisted Matrix Free LDI-MS