

Combating Antimicrobial Resistance: From Peptide Design to Delivery Methods



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Biography: Dr. R. Lakshminarayanan obtained his PhD from the Department of Chemistry at the National University of Singapore. He was a recipient of the Singapore Millennium Foundation Postdoctoral Fellow from the same department and then obtained his postdoctoral training at the Center for Craniofacial Molecular Biology at the University of Southern California. He joined the Singapore Eye Research Institute (SERI) as a Senior Scientist. Currently, he is working as the Deputy Head and Principal Investigator II of the Anti-Infectives Research Group at SERI. His major interests include antimicrobial peptides design, biomaterials, durable antimicrobial contact lenses and devices, topical delivery of antimicrobial peptides and protein aggregation diseases. He has published more than 80 papers in reputed journals and recipient of competitive grants.

Abstract: The continued emergence of antibiotic-resistance by bacteria and fungus with the potential to cause fatal infections poses a catastrophic threat world-wide. The strong decline of new antibiotic pipeline and a sharp decrease in the number of companies investing in antibiotic research has exacerbated the problems. In addition, bottlenecks in the development of new antibiotics pipeline, unfavorable economic profits and stringent regulatory guidelines complicate the problem further. In this talk, I will discuss three divergent but related strategies to avert antimicrobial resistance. In the first approach, I will highlight the use of cationic branched or host-defense peptides which target the cytoplasmic membrane of the microbes without affecting the mammalian cells. Next, I will discuss the role of LPS supramolecular disruptors and membrane fluidizers in enhancing the uptake of antibacterials and antifungals, respectively thus reducing their excessive usage. Finally, I will detail the development of prototype wound dressings with long-term antimicrobial activity and tissue engineering scaffolds using the mussel-inspired crosslinking of catecholamines. The use of cell selective peptides, use of antibiotic-non-antibiotic combinations that can reduce the effective dose of antimicrobials and advanced wound dressings with long term antimicrobial activity may shed insights into the development of new therapeutics and medical devices for combating antimicrobial resistance.