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Nanotechnology for combating multi-drug resistance: A next generation antimicrobial therapy

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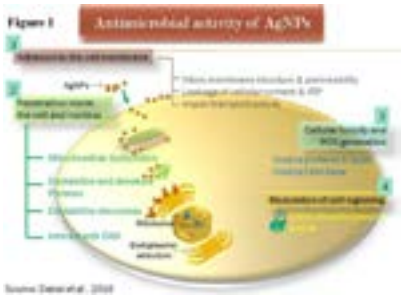
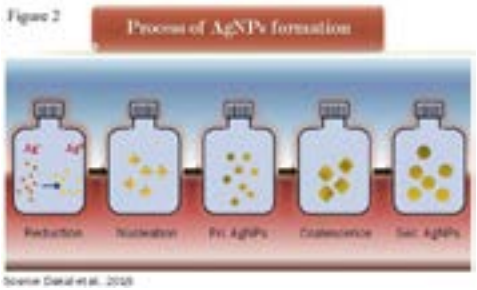
Statement of the Problem: Multidrug resistance of the pathogenic microorganisms has become a major impediment toward successful diagnosis of infectious diseases. Recent advancements in nanotechnology-based medicines have opened new horizons for combating multidrug resistance. In particular, the use of silver nanoparticles (AgNPs) as a potent antibacterial agent has received much attention. AgNPs exhibits their antimicrobial activity through multifaceted mechanisms. Figure 1 depicts the most prominent modes of antimicrobial action of AgNPs. Herein, we have summarized our endeavors that address current challenges in relation to safe use of AgNPs in therapeutics and drug delivery platforms.

Methodology & Theoretical Orientation: AgNPs were synthesized using plant extract as diagrammatically represented in Figure 2. Antimicrobial activity of AgNPs was assayed using agar disc-diffusion method.

Findings: In our study, biosynthesized AgNPs showed remarkable antimicrobial activity against isolated MDR strains of *S. aureus & P. aeruginosa* as well as against fungal strains.

Conclusion & Significance: We believe that AgNPs with controlled physico-chemical properties can be engineered for ensuring maximal efficacy, stability, specificity & biocompatibility.





Biography

Tikam Chand Dakal has his expertise in multi-drug resistance and its mechanism. His current interest is to study the effect of genetic mutations on structure and function of multi-drug transport proteins in bacteria, yeasts and fungus. His approach includes use of in-silico (computational) tools to perform structural modeling and docking studies on various antibiotic drugs and their target transporter proteins. He believes that nanotechnology based biomedicines have emerged as an alternative next generation antimicrobial therapy against multi-drug resistant strains of bacteria, yeasts and fungus. In particular, the use of silver nanoparticles (AgNPs) as a potent antibacterial agent has received much attention in past decades. He also believes that several aspects of AgNPs-based medicines including, microbial resistance to AgNPs; cytotoxic, genotoxic and inflammatory response of AgNPs to human cells etc., need to be evaluated for successful application of AgNPs in therapeutics and targeted drug delivery platforms.

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