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Escherichia coli antibiotic resistance: Bioactivity and utilization of novel biotechnological approaches to control infections

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Bacteria are the microorganisms that most frequently cause infectious diseases in humans. The presence of antibiotic resistance strains in environment may be understood as a response to the selective pressures. The synthesis of silver nanoparticles (AgNPs) has attracted interest due to the new and different physical and chemical characteristics with various applications. AgNPs, alone or supported on ceramic, are used as antimicrobial fillers in textiles and polymers for food-packaging and biomedical pourposes, for antimicrobial paints, and potentially for drug delivery. The evaluation of mesoporous nanostructures or nanocomposites as FDU-12/lignin/silver was effective in inhibiting *Staphylococcus aureus, E. coli, Enterococcus faecalis* and *Candida albicans*. The best results were achieved against the inhibition of *E. coli* and with the structures FDU-12/silver. In plates with FDU-12/lignin/silver, FDU-12, FDU-12/lignin, and the positive control, it was enumerated at 0, 6, 14, and 27 colonies, respectively. While the development of resistance to a new antibiotic is expected, the time course and degree of resistance are uncertain and depend on various factors. The application of AgNPs as nanocomposites can alter the expression of bacterial proteins and could be used for inactivation. These data explores such aspects and a number of factors arising like the use of nanostructures against E. coli. The study of bacterial resistance can contribute to the discovery of the potential sources and novel alleles of antibiotic resistance genes.

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