Opinion

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Silver Nanoparticles Stabilized in Solution by Sodium Alginate Have Antimicrobial Effects

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Opinion

One of the current research focuses is to investigate the biological properties of metal nanoparticles in relation to important recent advances in nanomedicine and nanopharmacology. Nanomedicine is the study of the use of nanotechnologies in medicine to diagnose, cure, and prevent a variety of diseases. The mechanisms of action of medications based on silver nanoparticles are of special interest to researchers. It's worth noting that silver-based medications have long been utilised as antiseptics and anti-inflammatory treatments. The creation of medications with higher bactericidal, antiviral, antifungal, and antiseptic actions, as well as the ability to operate as high-efficiency disinfectants for a wide spectrum of harmful microbes, was aided by the introduction of nanosized silver.

The highly specific surface area of nanoparticles dramatically increases the areas of interaction between nanosilver and bacteria/viruses, significantly improving nanosilver's bactericidal effects. As a result, using silver nanoparticles in a solution allows one to reduce metal concentration by a factor of hundreds while maintaining bactericidal capabilities. The highly specific surface area of nanoparticles dramatically increases the areas of interaction between nanosilver and bacteria/viruses, significantly improving nanosilver's bactericidal effects. As a result, using silver nanoparticles in a solution allows one to reduce metal concentration by a factor of hundreds while maintaining bactericidal capabilities.

However, there are several obstacles to putting silver nanoparticles to practical use, the most significant of which is the manufacture of nano-sized particles within a specified size range, as well as the development of stable colloidal systems that prevent nanoparticle agglomeration. The most challenging task is finding the best nanoparticle stabiliser, however there are several approaches to tackling it.

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Because the toxicity of silver nanoparticles has yet to be determined, further research into their application is required. The development of nanotoxicology for these nanoparticles necessitates the quick development of new quantitative control methods that allow for the evaluation of distinct nanoforms' biological effects. The luminous bacteria toxicity assay, which involves examining bioluminescence suppression in photobacteria, has been proposed as a tool to assess nanoparticle toxicity. The reduction in bacterial luminescence is now linked to toxicity, ecotoxicity, biocidal and antibiotic characteristics, among other things.

This method is promising for quick application (especially in field situations) since a time of ten to fifteen minutes is long enough to quantitatively analyse the acute effect on the samples. The goal of this work was to see how a nanosilver solution in a sodium alginate matrix affected pathogenic bacteria (*S. aureus, E. faecalis, E. coli, P. vulgaris, E. cloacae*, *P. aeruginosa*), the yeast-like fungus *C. albicans*, and bioluminescence in the luminous bacteria *P. leiognathi* Sh1. so that we can see whether we can use luminous bacteria to test the toxicity of nanoparticles

The researchers utilised a nanobiocomposition made up of 0.1% (weight/volume) silver nanoparticles 10-20 nm in size dispersed in a sodium alginate matrix (0.6%) and aqueous medium (99.3%). The Taurida National University (Simferopol) and the Institute of Biology of the Southern Seas (Sevastopol) collaborated on the composition. Using a luminous bacteria assay, researchers investigated the antibacterial, antifungal, and biocidal effects of this nanosilver solution stabilised by sodium alginate. The

antibacterial effect of nanosilver solution with an alginate stabiliser was investigated on *S. aureus, E. faecalis, E. coli, P. vulgaris,* and *E. cloacae* isolates obtained by inoculating onto agar bronchoalveolar and peritoneal lavage samples obtained from laboratory rats experimentally simulated with pneumonia and faecal peritonitis.