

Chapter 14

Biosynthesis, Mechanisms, and Biomedical Applications of Silver Nanoparticles



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Abstract Nanoparticles (NPs) can be developed to improve drug penetration and reorient chemotherapy, or selectively target the cancer cells or cell compartment. Both passive and active targeting strategies are used to redirect the anticancer drugs. Noble metals such as the silver NPs (AgNPs) are characterized by electrical, optical, and thermal properties, and can be integrated into products for optical, biological and chemical sensor applications such as pastes, conductive inks, and fillers for high stabilization, electrical conductivity, and low sintering temperatures. The biosynthesis of AgNPs, making use of bacteria, fungi, actinomycetes, yeast, algae, and plants, is eco-friendly, green, nontoxic and inexpensive. The AgNPs synthesized are of various shapes and sizes. The AgNPs have diverse bioactivities including antibacterial, antifungal, antiviral, anti-inflammatory, anti-angiogenic, and anticancer activities, with great potential for use in cancer diagnosis and therapy. The mechanisms of AgNP-induced cytotoxicity include endoplasmic reticulum stress, lactate dehydrogenase leakage, and enhanced reactive oxygen species level. Co-application of AgNPs and natural products could play an essential role in nanoscience and nanotechnology, especially in nanomedicine for cancer diagnosis and therapeutics.

Keywords Anti-cancer · Nanobiotechnology · Nanocarrier · Nanomedicine · Silver Nanoparticles

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