

# Cytotoxicity and ROS production of manufactured silver nanoparticles of different sizes in hepatoma and leukemia cells

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## Keywords:

silver nanoparticles; cytotoxicity; N-acetyl-cysteine; reactive oxygen species; glutathione

# ABSTRACT

Silver nanoparticles (AgNPs), which have well-known antimicrobial properties, are extensively used in various medical and general applications. In spite of the widespread use of AgNPs, relatively few studies have been undertaken to determine the cytotoxic effects of AgNPs. The aim of this study was investigate how AgNPs of different sizes (4.7 and 42 nm) interact with two different tumoral human cell lines (hepatoma [HepG2] and leukemia [HL-60]). In addition, glutathione depletion, inhibition of superoxide dismutase (SOD) and reactive oxygen species (ROS) generation were used to evaluate feasible mechanisms by which AgNPs exerted its toxicity. AgNPs of 4.7 nm and 42 nm exhibited a dramatic difference in cytotoxicity. Small AgNPs were much more cytotoxic than large AgNPs. A difference in the cellular response to AgNPs was found. HepG2 cells showed a higher sensitivity to the AgNPs than HL-60. However, the cytotoxicity induced by AgNPs was efficiently prevented by NAC treatment, which suggests that oxidative stress is primarily responsible for the cytotoxicity of AgNPs. Furthermore, cellular antioxidant status was disturbed: AgNPs exposure caused ROS production, glutathione depletion and slight, but not statistically significant inactivation of SOD. Copyright © 2013 John Wiley & Sons, Ltd.

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