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GENOTOXICITY STUDY OF SILVER NANOPARTICLES IN BONE MARROW CELLS OF SPRAGUE-DAWLEY RATS.

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Abstract: The antibacterial effect of silver nanoparticles has resulted in their extensive application in health, electronic, and household products. However, while the population exposed to silver nanoparticles continues to increase with ever new applications, silver nanoparticles remain a controversial research area as regards their toxicity to biological systems. In particular, the oral toxicity of silver nanoparticles is of particular concern to ensure public and consumer health. Due to the intensive commercial application of silver nanoparticles (AgNPs), risk assessment of this nanoparticle is of great importance. The previous in vitro studies demonstrated that AgNPs caused toxicity in various cell-lines. However, toxicity of AgNPs *in vivo* is largely lacking. The aim of this investigation was to determine the clastogenic/genotoxic potential of silver nanoparticles in bone marrow cells of Sprague-Dawley rats; using mitotic index (MI), structural chromosome aberrations (SCA) and micronuclei (MN) formation as genetic endpoints. Four groups of five male rats, each weighing approximately 80 $\pm$ 2 g, were administered orally, once a day for five days with doses of 5, 25, 50, 100, mg/kg body weight (BW) of silver nanoparticles. A control group was also made of five rats. Chromosome and micronuclei from bone marrow cells were processed and examined following standard protocols. The results demonstrated that silver nanoparticles exposure significantly increased *($p<0.05$)* the number of structural chromosomal aberrations, the frequency of micro-nucleated cells and decreased the mitotic index in exposed groups compared to control. The results of our study suggest that exposure to silver nanoparticles has the potential to cause genetic damage. Further characterization of their systemic toxicity, genotoxicity and carcinogenicity is also essential.

Keywords: clastogenic/genotoxic, Sprague-dawley rats, chromosomal aberrations, micronuclei, mitotic index, silver nanoparticles, bone marrow cells.

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