

Toxicity effect of silver nanoparticles on HepG2 cell line and mice liver primary cell culture

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Background and Aims: Nano-silver has biological properties, significant for consumer products, food technology, textiles and medical applications (e.g. wound care products, implantable medical devices). In addition AgNPs has unique optical and physical properties which are not present in bulk silver and are claimed to have great potentiality for medical applications (e.g. in diagnosis, drug delivery, and imaging). For their antibacterial activity, silver nanoparticles (Ag NPs) are largely used in various commercially available products. Thus, the use of nano-silver is becoming more widespread in medicine and related applications, and due to its increasing exposure, toxicological and environmental issues need to be raised. In this study we investigated the cytotoxic effects of Ag NPs on HepG2 cell line and primary liver cells of mice.

Methods: Cell viability was examined with MTT assay after HepG2 cells exposure to AgNPs at 1, 2, 3, 4, 5, 7.5, 10 ppm compared to mice primary liver cells at 1, 10, 50, 100, 150, 200, 400 ppm for 24h.

Results: AgNPs caused a concentration- dependent decrease of cell viability. IC₅₀ value of 2.764ppm was calculated in HepG2 cell line and IC₅₀ value of 121.7 ppm was calculated in primary liver cells of mice. The results of this experiment indicated that silver nanoparticles had cytotoxic effects on HepG2 cell line and primary liver cells of mice.

Conclusion: The results illustrated that nano-silver had 44 times more inhibition effect on the growth of cancerous cells (HepG2 cell line) as compared to the normal cells (primary liver cells of mice). This effect is probably due to the direct effect of nano-silver on the cell oxidation system. The activity of the mitochondrial respiration system in cancerous cells (HepG2 cell line) is greater than that of the normal cells which might further justify AgNPs as a potential candidate for cancer treatment.

Keywords: Silver nanoparticle; HepG2 cell line; Primary liver cells of mice; MTT