

IMMUNOCYTOCHEMICAL AND ULTRASTRUCTURAL ANALYSIS OF CELLS AFTER APPLICATION OF ZINC OXIDE NANOPARTICLES

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Abstract

Zinc oxide (ZnO) is among the most commonly utilized group of nanomaterials and has wide-ranging applications. Zinc oxide nanoparticles are increasingly used in food additives, biosensors, sunscreens, pigments, electronic materials and rubber manufacture. With the wide application of zinc oxide nanoparticles, concern has been raised about its unmeant health and environmental impacts. Potential toxicity was evaluated by observing changes in cell morphology, cell viability, oxidative stress parameters, DNA damage analysis, and gene expression. Morphological changes comprise cell shrinkage, nuclear condensation, and formation of apoptotic bodies. Methods: Human Caucasian lung carcinoma type II epithelial cells, A549 cell line, were exposed to zinc oxide nanoparticles. Particles were incubated with cells for 3 h and 23 h. Cells were processed for immunocytochemical and electron microscopy analysis. Used immunostaining markers were Ki67, Bcl2, p21, p53 and p27. Results: Immunocytochemical and ultrastructural features were observed. In electron microscope were present cytoplasmic condensation, fragmentation of nuclear material, vacuolization of the cytoplasm, and blebbing of plasma membranes. These are characteristic features of cells undergoing apoptosis. Nanoparticles are increasingly used in a wide range of applications in science, technology and medicine. Their health implications are still subject of many studies. One of the mechanisms by which particles can cause toxicity in cells is possibly through oxidative stress-induced apoptosis.

Keywords: Zinc oxide nanoparticles, cell line A549, immunocytochemistry, transmission electron microscope

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