

COMPARISON OF THE CYTOTOXICITY AND DNA DAMAGE INDUCED BY CeO₂ AND TiO₂ NANOPARTICLES IN A549 CELL LINE

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Abstract

The work focuses on qualitative and quantitative assessment of the DNA damage and cytotoxicity induced by CeO₂ and TiO₂ nanoparticles in the absence of photoactivation. The samples differ in the values of specific surface area and particle sizes (CeO₂: 50 nm, 25 nm; TiO₂: 22 nm, 19 nm) or, in case of TiO₂, also in the crystal form (anatase/rutile, anatase). Human lung adenocarcinomic cell line (A549) was used as an experimental model. The cells were exposed to concentrations of 1000, 500, 100, 10 and 1 µg/ml of nanoparticles for 3 and 24 hours. The level of DNA damage was determined by the Comet assay. The percentage of DNA in a tail of the comet was applied as the parameter for the DNA damage quantification. Cytotoxicity was assessed by the trypan blue viability assay and the MTT cell proliferation assay. The results suggested that the CeO₂ and TiO₂ nanoparticles induced the DNA damage in A549 cells. The degree of DNA damage after an 3-hour exposure was higher than after a 24-hour period. Viability of A549 cells treated by nanoparticles for 24 hours significantly decreased. Biological effects of the nanoparticles depended on the particle size, dose and exposure time.

Keywords: A549 cells, nano-CeO₂, nano-TiO₂, Comet assay, viability

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