

Toxicological Investigation Of Nanoparticles - Effects On Human Cells

The aim of the present study was the establishment of an in vitro test system to reveal the potential risk to human health of nanoparticles at the workplace. The essential advantage of in vitro investigations is to be non-invasive, the employees don't have to be bothered and the work routine doesn't have to be intercepted. At occupational settings test cells on Transwell® inserts were exposed to the workplace atmosphere or to particle filtered air for 1 to 3 hrs using a CULTEX® System. 2 types of co-cultures were tested: In the first type differentiated macrophages were exposed and post-incubated with human lung epithelial cells. In the second type differentiated macrophages were seeded on human lung epithelial cells and the co-culture was exposed.

As endpoints for particle exposure cell viability (WST-1 assay), oxidative stress (DHR-Assay) and pro-inflammatory cytokines (BD™ CBA-Assay) were evaluated. Cell viability testing showed a negative effect at high exposure. In cells exposed to the workplace atmosphere an increased oxidative burst was detected compared to cells exposed to particle filtered air. Exposure of co-cultures resulted in significantly enhanced TNF- α , IL-6, IL-1 β and IL-8 levels.

We could show that our in vitro exposure system is very well adapted for the assessment of adverse effects of nanoparticles at the workplace. Our results indicate that nanoparticles involve an occupational risk and further experiments will be performed to analyse additional endpoints.

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