



Contribution ID: 32

Type: not specified

Surface reactivity of CuO NPs is responsible for the early oxidative damages to A549 cells: a Trojan-horse independent mechanism

Monday, 9 March 2015 17:30 (30 minutes)

“Abstract: Background

It has been demonstrated that CuO NPs are highly cytotoxic for the most of mammalian cells. The classical Trojan horse mechanism is retained to be the driver of cell death mainly after long exposure periods. This work aims to demonstrate that CuO NPs may have specific cell reactivity in the first phases of exposure independent from intracellular ion dissolution.

Methods

CuO NPs with similar primary size but different crystallinity and extracellular ROS production (Perelshtein et al., 2014) were administered to A549 cells as model for human toxicity. After assessing of cell viability SH-oxidation and protein carbonylation were monitored by immunocytochemistry and immunoblotting. Electron microscopy techniques were used to investigate cell-particle interactions.

Results

All NPs induced very early oxidative stress leading to a significant cell viability decrease after 3-6h of exposure. This effect was more pronounced for semi-crystalline CuO NPs and was independent from extra- and intracellular copper release although particles were detected both on cell surface and in cytoplasm already after 1h of exposure.

Conclusions

CuO NPs induce very early cell oxidative responses related to the specific NP surface reactivity, with semi-crystalline CuO NPs displaying the higher cytotoxicity. Since CuO-based NMs have been suggested as powerful biocidals a better characterization of the reactions at the bio-interfaces may help nanotechnologist in the safe-by-design synthesis of new antimicrobials.”

Primary author: MOSCHINI, Elisa (University of Milano Bicocca)

Co-author: MANTECCA, Paride (University of Milano Bicocca)

Presenter: MOSCHINI, Elisa (University of Milano Bicocca)

Session Classification: 2A Toxicology and human health risks

Track Classification: Parallel session 2A: Toxicology and human health risks