Evaluating the cytotoxic potential of a panel of manufactured nanomaterials using the plating efficiency assay

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INTRODUCTION

Nanomaterials (NM) with physicochemical features useful for applications in consumer products and medicine

Toxicity the properties that make them useful may also increase their toxicity

Problem many methods are vulnerable to interference of the nanomaterials with the detection process

Safety Assessment fast- and cost-effective toxicology screening strategies are necessary

The objective was to analyze the cytotoxic effects of a panel of 11 benchmark NM in human respiratory cells (A549) using plating efficiency (PE) assay and a spectrophotometric method (MTT).

METHODS

SILICON DIOXIDE (NM-200 and NM-203)
TITANIUM DIOXIDE (NM-100, NM-101, NM-103)
SILVER (NM-300k, NM-302)
CERIUM OXIDE (NM-212)
BARIUM SULPHATE (NM-220)
ZINC OXIDE (NM-110)
CARBON NANOTUBES (NM-401)

DLS
batch dispersions and their dilutions in the cell medium

Human lung adenocarcinoma epithelial cell line
7 days of exposure to NM
24 hours of exposure to NM

RESULTS

DLS – NMs’ batch dispersion
Homogeneous dispersion → NM-100, NM-101, NM-203, NM-300k, NM-212, NM-220, NM-110
Multimodal size-distribution → NM-103, NM-200, NM-302 and NM-401

PE assay
Positive results for most nanomaterials
Although not directly comparable, PE seems more sensitive than MTT to NMs’ induced toxicity
Long-term exposure to NMs is possibly more relevant to address impact of NMs

Cytotoxic → NM-101, NM-200, NM-203, NM-300k, NM-302, NM-212, NM-110, NM-401.
Not cytotoxic → NM-100, NM-103 and NM-220.

MTT assay

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