Cell viability assay to test Nanoparticles Cytotoxicity

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Inorganic and organic nanoparticles employed in creams, implants, drug carriers or as contrast agents need biocompatibility studies to test their potential cytotoxicity.

SITUATION

The instability in physiological medium or aggregates formation of the nanoparticles are important limitations for their *in vivo* use and for testing the biocompatibility *in vitro*. The cytotoxic effect could be due to the aggregation, the release of ions and the degradation of the nanoparticles. The effect on cell viability is usually evaluated in human cell lines.

APPROACH

The cell viability was determined based on metabolic activity. Mitochondrial enzymes activity was checked in various cell quantities at different incubation times. The optimal cell quantity for each cell line was incubated at different concentrations of nanoparticles for 24 and 48 hours. The reagent was incubated with the cells and the absorbance was determined in the supernatants to avoid possible interference due to the nanoparticles.

RESULTS

Cell viability assay in cancer cell lines derived from lung epithelial (A549, SK-MES-1 and NCI-H460) showed a cytotoxic effect (Figure 1). Determination of the lethal dose 50 (LD 50) for prototype 3 was determined testing concentrations between 50 – 500 µg/mL. The LD 50 was reached at ≥ 150 µg/ml prototype 3 for all the cell types tested (Figure 2).

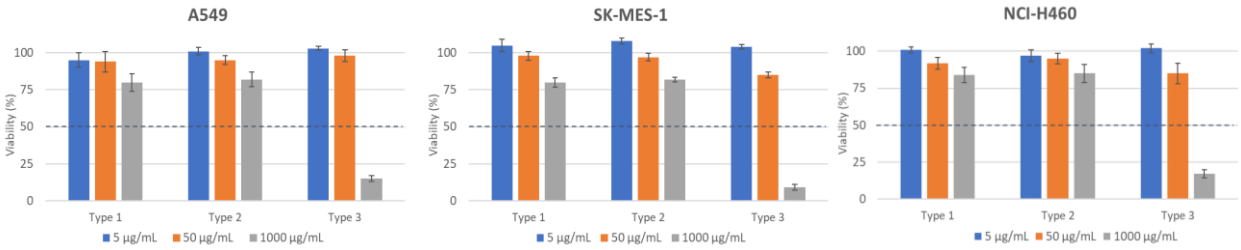

Figure 1_ The viability of three types of nanoparticles were tested at 5 µg/mL, 50 µg/mL and 1000 µg/mL. Type 3 nanoparticle affect the viability of the cell lines A549, SK-MES-1 and NCI-H460 at 48 hours of incubation. The absorbances were normalized respect to cells without treatment.

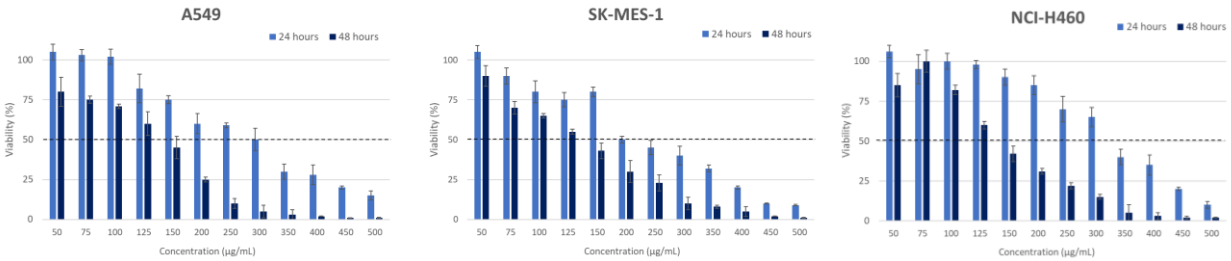

Figure 2_ Viability obtained at different concentrations of the nanoparticle type 3 in A549, SK-MES-1 and NCI-H460. At 48 hours of incubation, the lethal dose 50 achieved in all cell lines was ≥ 150 µg/mL. The absorbances were normalized respect to cells without treatment

Staining, colorimetric, fluorescent and label-free methods are available to determine cell viability and they are necessary for the *in vitro* and *in vivo* validation of nanomaterials.

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