# Comet assay as a method for genotoxic assessment of engineered nanomaterials

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Nanomaterials (NMs) display many unique and useful physico-chemical properties and, for this reason Nanothechnology has become a new vigorous discipline. Engineered NM (ENMs) are being commonly used in a wide range of applications and, consequently, humans are environmentally exposed to them. As some of the ENMs have shown strong biological reactivity there is an urgent need of information on their potential harmful effects.

The mechanism of toxicity usually involves DNA damage, for this reason genotoxicity has become an important endpoint to be evaluated in risk assessment approaches. In this context, the comet assay, or single cell gel electrophoresis (SCGE) assay, has demonstrated to be a sensitive method for detecting strand damage in the DNA as well as induction of oxidatively damaged DNA.

In the current study, we have been working with eight ENMs by using two different cells lines. i) BEAS-2B, a transformed normal human bronchial epithelium, and ii) A549, a human lung carcinoma. Previous studies of characterization by transmission electron microscopy (TEM) and dynamic light scattering (DLS) were carried out. Additionally, toxicity experiments were also carried out to select the range of concentrations to be evaluated.

Obtained results indicate that two of the tested ENMs, namely $TiO_2$- and $SiO_2$-NM, were able to induce both genomic and oxidative damage in BEAS-2B cells. With regard to the use of A549 cells they were able to detect genotoxic effects of a wider range of ENMs including $TiO_2$-, ZnO-, $CeO_2$-, $SiO_2$-NM and MWCNT. These results indicated that A549 cells are much more sensitive to the genotoxic effects of ENMs than BEAS-2B cells.

These results support the view that the potential genotoxicity of ENMs is modulated by different factors, including the selected cell line. According to that, more than one cell line should be included in the genotoxicity testing of ENMs.