Genotoxicity Assessment of Air-Borne Engineered Nanomaterials using the BEAS-2B and A549 *in vitro* system.

Alba García, Laura Rubio, Ricard Marcos, Alba Hernández

Grup de Mutagènesi, Departament de Genètica i de Microbiologia, Facultat de Biociències, Universitat Autònoma de Barcelona, Bellaterra, Spain; CIBER Epidemiología y Salud Pública, ISCIII, Spain.
alba.garcia.rodriguez@uab.cat

Abstract

Nanomaterials (NMs) display many unique and useful physico-chemical properties. For this reason, since many years ago, Nanothechnology has become increase such as a new discipline in order to design and synthesize engineered nanomaterials (ENMs). Furthermore, the ENMs are being commonly used in a wide range of applications in the industrial, electrical, pharmaceutical and biomedical fields and are included in several consumer products such as cosmetics, food packaging, aerosols-like products, etc. Inhalation is one of the major routes of exposure to the ENPs and is considered to be the primary route by which humans get exposed to the air-borne ENPs. After inhalation, the ENPs are likely to get deposited in different regions of the respiratory tract depending on the particle size. Several kinds of sicknesses can be expected from exposure to ENPs, including asthma, bronchitis, lung and liver cancer and others (Gasser et al., 2012, Nemmar, Holme, Rosas, Schwarze, & Alfaro-moreno, 2013, Farcal et al., 2015).

In the present study, the in vitro genotoxicity of two different air-borne ENMs (MWCNT and CeO_2) was evaluated in two cellular models representing the lung as a target organ/system. The cells lines were BEAS-2B a transformed normal human bronchial epithelium and A549 a human lung carcinoma. Sub-toxic concentrations from each NM were used to perform a Comet Assay of 24 hours treatment. In this case, the results lead us to the conclusion that there is no presence of genotoxic damage neither oxidative damage for both cell system and for both ENMs.

References

Farcal, L., Andón, F. T., Cristo, L. Di, Rotoli, B. M., Bussolati, O., Bergamaschi, E., … Bai, R. doi:10.1371/journal.pone.0127174. Comprehensive In Vitro Toxicity Testing of a Panel of Representative Oxide Nanomaterials□: First Steps towards an Intelligent Testing Strategy. (2015).1–34.

Gasser, M., Wick, P., Clift, M. J. D., Blank, F., Diener, L., Yan, B., … Rothen-rutishauser, B. Particle and Fibre Toxicology. Pulmonary surfactant coating of multi-walled carbon nanotubes (MWCNTs) influences their oxidative and pro-inflammatory potential in vitro. (2012).1–13.

Nemmar, A., Holme, J. A., Rosas, I., Schwarze, P. E., & Alfaro-moreno, E. BioMe Research International. Recent Advances in Particulate Matter and Nanoparticle Toxicology□: A Review of the In Vivo and In Vitro Studies, 2013. 1–22.

Figures

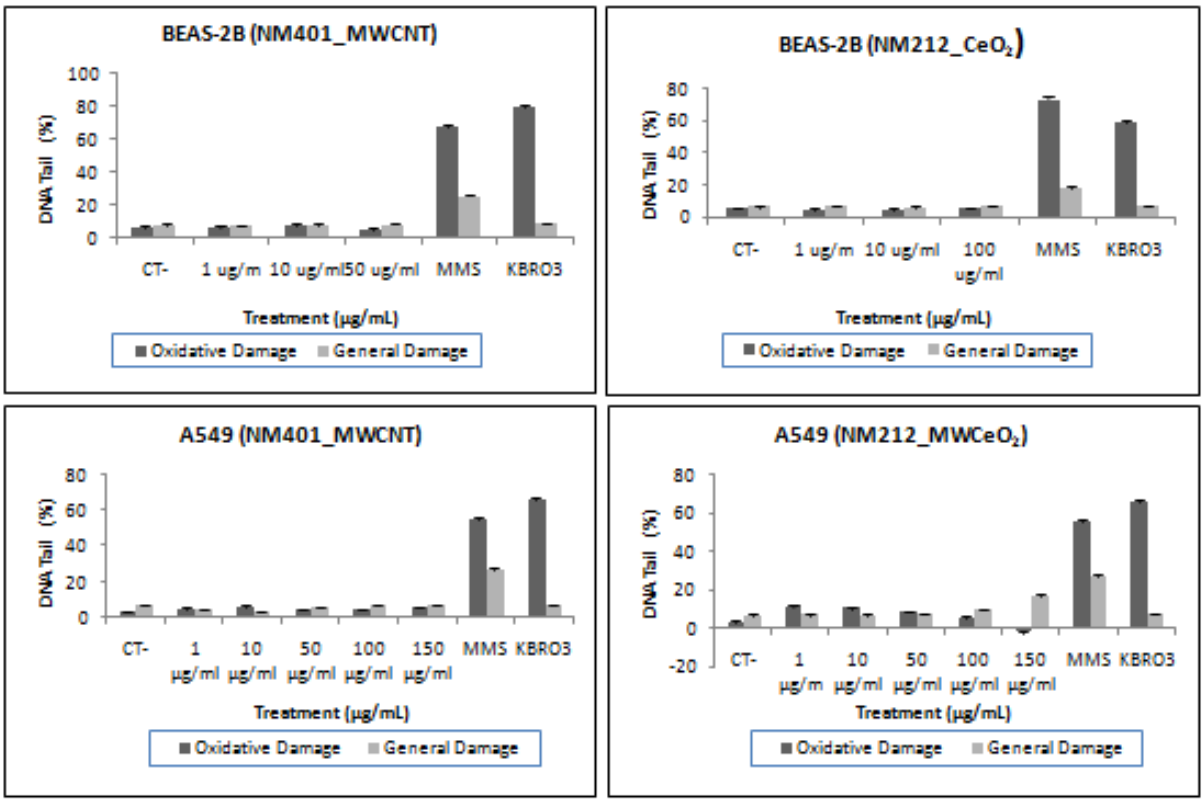

Figure 1. Oxidative damage and general damage assessed by the Comet Assay. Results regarding two cell lines, BEAS-2B and A549, and treated with two different air-borne ENPs, Multi-wall Carbon Nanotube (MWCNT) and Cerium dioxide (CeO_2). As a positive control for the Genotoxic damage we used MMS, and for the Oxidative damage we used $KBrO_3$.