Changes in microRNAs expression associated to long-term exposure to nanomaterials

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Nanotechnology is an emerging field with good perspectives in many biomedical and industrial applications. For this reason, the presence of nanoparticles in the environment is steadily rising and, potentially, affecting humans. Therefore, research on the molecular mechanisms affected by the presence of these nanoparticles is required to achieve a better understanding of their exposure associated health risks.

MicroRNAs are small non-coding single-strand RNA molecules of 20-24 nucleotides-long, which main function is posttranscriptional regulation of gene expression. They participate in numerous biological processes, such as cancer, inflammatory processes, etc. Consequently, changes in their expression can serve as biomarkers for early detection of tumoral phenotype.

The main objective of this study is to establish if there are expression changes in a battery of microRNAs related to cancer and disease after an *in vitro* long-term exposure to low-dose to nanomaterials able to induce cell transformation. For that purpose human lung epithelial BEAS 2B cells were exposed chronically to different nanomaterials, specifically, cerium dioxide NPs (CeONPs), titanium dioxide nanoparticles (TiO_2NPs), and multi walled carbon nanotubes (MWCNT). In addition, cerium dioxide was co-exposed with cigarette smoke condensate (CSC), since CeO_2 did not induce cell transformation on its own, but was found to increase the oncogenic potential of CSC. Cells were collected before and after the acquisition of the tumor-like phenotype and changes in the microRNAs expression were evaluated by qPCR.

The study revealed changes in the microRNAs expression pattern during the NM-long-term exposure which were found to be dependent of both, time-of-exposure and dose. Hence, some microRNA elicited as new candidate biomarkers of NM long-term exposure and transforming effects.

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