

Title *

Inhaled multi-walled carbon nanotubes-induced gene expression profile in rat lung

Abstract *

Due to the attractive physicochemical properties of nanomaterials, in particular those of carbon nanotubes (CNTs), their industrial use is constantly increasing. Because of the insufficient knowledge about the CNTs toxicity the assessment of their potential hazard for workers health is a necessity. Since the main route of occupational exposure is inhalation, evaluation of the toxicological properties was assessed by inhalation in laboratory rodents with two multi-walled CNTs: NM-401 and NM-403. Rats were nose-only exposed 6 hours/day, 5 days/week for 4 weeks to the fully characterized aerosols (0.5 and 1.5 mg/m³) and tissues were collected 3, 30, 90 and 180 days after the end of the exposure. Results obtained from conventional approaches demonstrated an induction of pulmonary inflammatory response mainly at the shortest post-exposure time-point, which decreased overtime. On the other hand, molecular approach allows identification of changes in lung gene expression after the end of exposure. Gene expression profile was performed by transcriptomics experiments using Agilent technology and data were analyzed on GeneSpring software. In accordance with the observed induction of inflammatory response after the end of exposure by CNTs, modulation of genes coding for several chemokines and other actors involved in inflammation was observed. Interestingly, even the lowest dose of NM-401, which did not induce inflammatory response, modulated gene expression. Further analyses could result in establishing a link between carbon nanotube properties and key events associated with the observed toxicity. Then, transcriptomics experiments could participate in the identification of molecular initiating events that lead to CNT pulmonary toxicity.

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