**Overview of the project**

**Title:** Pulmonary toxicity and gene expression changes in response to whole-body inhalation exposure to multi-walled carbon nanotubes in rats.

**Introduction:**

Nanomaterials represent a new class of materials with numerous industrial applications. Considering the projected increase in the production and use of nanomaterials, a corresponding increase in occupational exposure to nanomaterials and their resulting adverse health effects may be anticipated among workers. There is substantial evidence in the literature, based on cell culture and animal studies, supporting the potential toxicity and detrimental health effects associated with exposure to nanomaterials. Intervention and/or prevention of adverse health effects associated with occupational exposure to toxic nanomaterials is a concern for health providers and regulatory and non-regulatory government agencies as the use of nanomaterials expand. A key element in the intervention and/or prevention of the adverse health effects associated with occupational exposure to toxic nanomaterials is a clear understanding of the molecular mechanisms underlying the pulmonary toxicity induced by nanomaterials.

Due to its physicochemical and mechanical properties, multi-walled carbon nanotubes (MWCNT) have found many industrial applications. There is potential for human exposure to MWCNT or products that contain MWCNT both during the production and use of the materials that contain MWCNT. The objectives of the current study were to investigate MWCNT-induced lung toxicity and the molecular mechanisms underlying that toxicity. A rat inhalation exposure model was employed to determine the lung toxicity induced by MWCNT. Global gene expression profiles in the lung and blood were conducted to determine the molecular mechanisms underlying MWCNT-induced lung toxicity.

**Methods Collection:**

* Multi-walled carbon nanotubes (MWCNT-7) obtained from Mitsui and Company (Tokyo, Japan) were used in the study.
* Male Fischer 344 rats were exposed by whole body inhalation to air or aerosol containing MWCNT-7.
* The rats were euthanized, and samples were collected to determine lung toxicity and gene expression profile.
* MWCNT-induced pulmonary toxicity was determined by analyzing lung histology. Additionally, bronchoalveolar lavage (BAL) parameters of toxicity such as the number BAL cells, oxidant generation, and BAL levels of cytokines were determined.
* Differential gene expression profile induced by the MWCNT exposure was determined by analyzing RNA isolated from the lung and blood by next generation sequencing.

**Citations (Publication based on the dataset):** Pulmonary toxicity and gene expression changes in response to whole-body inhalation exposure to multi-walled carbon nanotubes in rats. Inhal Toxicol. 2022;34(7-8):200-218. doi: 10.1080/08958378.2022.2081386.

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