Validation of an air-liquid interface toxicological set-up using Cu, Pd and Ag well-characterized nanostructured aggregates and spheres

SND-ID: snd0993-1. **Version**: 1.0. **DOI**: https://doi.org/10.5878/002761

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SND 0993-001 v1.0.zip *(121.16 KB)*

Associated documentation

Codebook SND 0993.pdf *(94.03 KB)*

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snd0993-1-1.0.zip *(~215.19 KB)*

Citation

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Creator/Principal investigator(s)

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Research principal

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Description

Systems for studying the toxicity of metal aggregates on the airways are normally not suited for evaluating the effects of individual particle characteristics. This study validates a set-up for toxicological studies of metal aggregates using an air-liquid interface approach.

The set-up used a spark discharge generator capable of generating aerosol metal aggregate particles and sintered near spheres. The set-up also contained an exposure chamber, The Nano Aerosol Chamber for In Vitro Toxicity (NACIVT). The system facilitates on-line characterization capabilities of mass mobility, mass concentration and number size distribution to determine the exposure. By dilution, the desired exposure level was controlled.

Primary and cancerous airway cells were exposed to copper (Cu), palladium (Pd) and silver (Ag) aggregates. For Cu and Pd an exposure of sintered aerosol particles were also produced. The doses of the particles was expressed as particle numbers, masses and surface areas. For the Cu, Pd and Ag aerosol particles, a range of mass surface concentrations on the air-liquid interface of 0.4-10.7, 0.9-46.6 and 0.1-1.4 µg / cm2, respectively were achieved. Viability was measured by WST-1 assay, cytokines (Il-6, Il-8, TNF-a, MCP) by Luminex technology.

Statistically significant effects, and dose response, on cytokine expression was observed for SAEC cells after exposure to Cu, Pd or Ag particles. Also, a positive dose response was observed for SAEC viability after Cu exposure. For A549 cells, statistically significant effects on viability was observed

after exposure to Cu and Pd particles.
The set-up produced a stable flow of aerosol particles with an exposure and dose expressed in terms of number, mass and surface area. Exposure related effects on the airway cellular models could be asserted.

Purpose:

The aim of this study is to validate a set-up for air-liquid interface toxicological research using highly characterized metal aggregate, and near spherical, aerosol particles. It combine a high output aerosol particle generator with continuous online exposure monitoring. The NACIVT was used for the study to ensure a high degree of deposition of aerosol particles on cell cultures, as well as to ensure a physiologically relevant environment during exposures.

Physical and biological data from air liquid interface cellular exposure studies.

Language

English

Unit of analysis

Other

Study design

Experimental study

Time period(s) investigated

2011-01-01 – 2013-01-01

Variables

64

Data format / data structure

Numeric

Data collection 1

- Time period(s) for data collection: 2011-01-01 – 2013-01-01
- Source of the data: Biological samples, Other

Geographic spread

Geographic description: Studen tog plats i Lund, Lunds Universitet.

Research area

Nano-technology (Standard för svensk indelning av forskningsämnen 2011)

Other medical and health sciences (Standard för svensk indelning av forskningsämnen 2011)

Keywords

Cytokinesis, Toxicity

Accessibility level

Access to data through SND
Data are freely accessible

Use of data

Things to consider when using data shared through SND

Versions

Version 1.0. 2016-03-01

Download metadata

DataCite

DDI 2.5

DDI 3.3

DCAT-AP-SE 2.0

JSON-LD

PDF

Citation (CSL)

File overview (CSV)

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