S²NANO

Physico-chemical determinants of toxicity: A rational approach towards safer nanostructured materials

DURATION OF THE PROJECT
Phase 1: 15/12/2006 – 31/01/2009
Phase 2: 01/02/2009 – 31/01/2011

BUDGET
798.069 €

KEYWORDS
Nanoparticules, nanotoxicology, surface chemistry, air pollution

CONTEXT

Nanomaterials are receiving increasing attention for their promise as engineering and biomedical revolutions of the 21st century. The rapid proliferation of many different engineered nanomaterials can, however, represent a hazard to human health, in occupational settings and possibly also for the consumer and the population at large. There is therefore a strong need to develop scientific knowledge that can be used by industrials to develop safer products and by regulators to control exposures and limit risks. These efforts will allow a sustainable development of this growing field of economical activity.

PROJECT DESCRIPTION

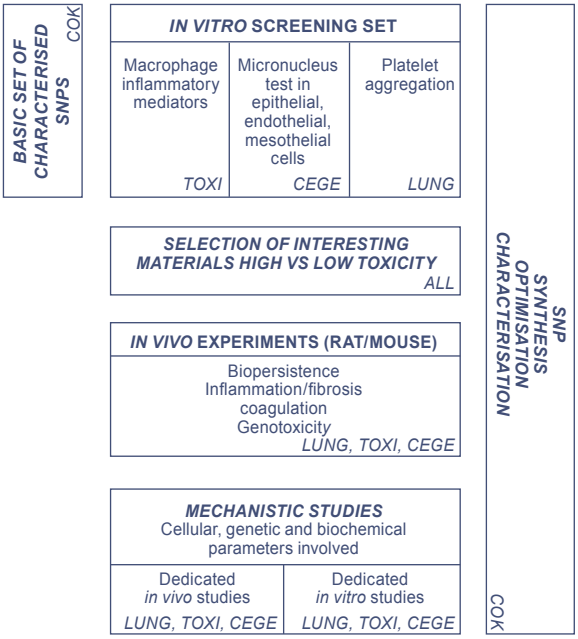
Objectives

To investigate experimentally the physico-chemical determinants of nanomaterials toxicity in order to provide guidelines for the design, production and control of safer and sustainable industrial products.

Methodology

A single model material, i.e. silicon-based nanoparticles, that can be finely designed and characterised by one of the partners (KULeuven-COK) to tune one selected physico-chemical characteristic at the time will be used. The project will focus on the inhalation toxicity of the particles, as the main likely and disquieting portal-of-entry for nanomaterials. The experimental strategy will apply a first set of in vitro screening tests exploring 3 critical biological endpoints in the expression of inhalation toxicity and for which each partner has strong expertise: production of inflammatory mediators by macrophages (UCL-TOXI), genotoxicity in epithelial, endothelial and mesothelial cells (VUB-CEGE), and platelet aggregation and coagulation (KULeuven-LUNG).

INTERACTION BETWEEN THE PARTNERS



EXPECTED RESULTS AND/OR PRODUCTS

Bridging and translating research data into information and/or guidelines useful for stakeholders will be achieved through close contacts with the follow-up committee, participation to national and international meetings and publications in peer-reviewed scientific journals.

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SCIENCE FOR A SUSTAINABLE DEVELOPMENT

HEALTH AND ENVIRONMENT

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PARTNERS - ACTIVITIES

TOXI has developed experimental models, both in vitro and in vivo, to elucidate determinants and mediators involved in the toxic response of the lung. Their expertise is internationally-recognised in the study of cytokine networks and proteases in lung inflammation and fibrosis.

CEGE investigates the mechanisms of action of mutagens/carcinogens (e.g. indirect mechanisms of genotoxicity by interference with spindle proteins, DNA repair enzymes and cellular trafficking). Their expertise in biomarkers of genotoxic effects is well recognized for *in vitro* screening and biomonitoring studies.

LUNG uses *in vivo* and *in vitro* models (using isolated pulmonary epithelial cells from animals and humans) to investigate the mechanisms of pulmonary toxicity. A special emphasis is put on the effects of ultra-fine particles on systemic inflammation and thrombosis/haemostasis.

The emphasis of the nanotechnology research of COK is at the molecular level, and especially on the engineering of an active catalytic site, and on the elaboration of suitable conditions and processes for operation of the newly developed catalyst.

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Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting
http://www.belspo.be/fedra
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