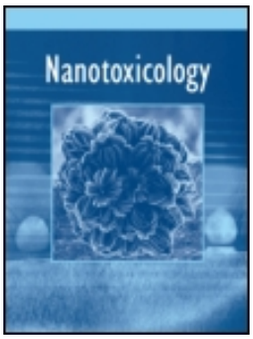

Nanotoxicology

ISSN: 1743-5390 (Print) 1743-5404 (Online) Journal homepage: informahealthcare.com/journals/inan20

Genotoxicity of engineered nanomaterials

Maria Donner, Lang Tran, Julie Muller & Henk Vrijhof

To cite this article: Maria Donner, Lang Tran, Julie Muller & Henk Vrijhof (2010) Genotoxicity of engineered nanomaterials, Nanotoxicology, 4:4, 345-346, DOI: 10.3109/17435390.2010.482750

To link to this article: https://doi.org/10.3109/17435390.2010.482750

Published online: 10 May 2010.

Nanotoxicology, December 2010; 4(4): 345–346

informa
healthcare

EDITORIAL

Genotoxicity of engineered nanomaterials

(Received 23 December 2009; accepted 14 March 2010)

This special issue of *Nanotoxicology* reviews the biological significance of the available information on the genotoxicity of engineered nanomaterials (ENM). The papers herein discuss approaches to identify and evaluate possible genotoxic effects. Knowledge of the mechanism of genotoxicity should support the rationale of genotoxicity testing of ENM.

The major target organs of ENM exposure are the lung, the central nervous system, and the cardiovascular system. An important point is the physico-chemical characterization of the test material according to the endpoint studied (e.g., mutagenicity, inflammatory response, DNA damage). Available studies have limited interpretability because material characteristics have not always been fully measured or reported. In light of the absence of definitive information regarding which properties of ENM can influence their acute and long-term biological activity, a basic set of physico-chemical parameters should be provided in toxicity screening. Since these features may change under experimental conditions (e.g., agglomeration, aggregation, surface charges), all these characteristics should preferably be measured in the actual test system using appropriate instruments and methods. Genotoxicity can be the result of a direct interaction with the DNA or indirectly as a consequence of interaction with a non-DNA target such as the spindle apparatus or DNA repair enzymes. Furthermore, it is essential to clarify whether ENM induce primary genotoxicity (elicited by the particles themselves) or cause secondary effects (elicited by the recruited inflammation). For example, although not equivalent measurements, both DNA damage assessed by the Comet assay and micronucleus production are indicators for genotoxicity but as endpoints incapable of differentiating between a primary or secondary mechanism. If cell lines are used to investigate genotoxicity of ENM, they should be p53 proficient [Note: p53 is a transcription factor which regulates the cell cycle and thus functions as a tumour suppressor]. In all studies, the human relevance of effective doses seen in experimental studies needs to be evaluated. Particularly with aerosols, agglomeration and aggregation of ENM makes it difficult to define the actual dose at the target.

This special issue also expands on the problems associated with genotoxicity testing of ENM, and elucidates possible genotoxic mechanisms to support improved test strategies. The papers seek to address four questions, whether: (i) Current OECD tests are appropriate and sufficient, (ii) ENM found systemically are biologically relevant, (iii) there is a minimal set of parameters to be reported in a study, and (iv) which ENM material can be used as a reference?

The papers included in this issue are based on presentations given at a symposium and forum jointly organised by the European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC) and the European Environmental Mutagen Society (EEMS) and held on Friday 21 August 2009 at the 10th International Conference on Environmental Mutagens (ICEM) in Florence, Italy.

Declaration of interest: The ECETOC-EEMS symposium and forum in Florence were supported by ECETOC, VCI (Germany), DuPont Haskell (USA), NASA (USA), Tor Vergata University (Rome, Italy) and Solvay Belgium. The Organising Committee included: H.-J. Wiegand (Chairman) – Evonik Degussa, Germany; E. Dogliotti – Istituto Superiore di Sanità, Italy; M. Donner – DuPont Haskell, USA; H. Greim – Technical University Munich, Germany; M. Kirsch-Volders – Vrije Universiteit Brussel, Belgium; J. Muller and P. Priem – Solvay, Belgium; H. Norppa – Finnish Institute of Occupational Health, Finland; L. Tran – Institute of Occupational Medicine, UK; T. Zeller (Part-time) – Cosmital (Procter & Gamble), Switzerland; H. Vrijhof (Scientific Secretary) – ECETOC, Belgium. The authors report no conflicts

ISSN 1743-5390 print/ISSN 1743-5404 online © 2010 Informa UK, Ltd.
DOI: 10.3109/17435390.2010.482750

of interest. The authors alone are responsible for the content and writing of the paper.

Maria Donner
DuPont Haskell Global Centers for Health and Environmental Sciences, Newark, DE, USA

Lang Tran
Institute of Occupational Medicine (IOM), Edinburgh, Scotland, UK

Julie Muller
Solvay, Brussels, Belgium

Henk Vrijhof*
European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC), Avenue E. Van Nieuwenhuyse 4 Box 6, B-1160 Brussels, Belgium.
Tel: +32 2 663 3813/675 3600.
Fax: +32 2 675 36 25.
E-mail: henk.vrijhof@ecetoc.org

*Corresponding author