Hazard determinants of carbon nanotubes (cnts) driving molecular initiating events (mies) in adverse outcome pathways (aops) of airways diseases

E Bergamaschi's scientific contributions

Publications (1)

Conference Paper: 1601d Hazard determinants of carbon nanotubes (cnts) driving molecular initiating events (mies) in adverse outcome pathways (aops) of airways diseases

E Bergamaschi · E Aldieri · E Gazzano · E Polimeni · I Fenoglio

Abstract: Introduction Because of their unique physico-chemical properties, CNTs have attracted a great deal of research interest and have many promising industrial applications. However, this also increases the exposure potential for workers, raising the need to understand their hazard for an effective occupational health and safety management. CNTs can induce lung inflammation, granuloma formation, fibrosis and cancer in rodents; in particular, MWCNTs are known to induce in vitro markers of remodelling and fibrosis. CNTs greatly vary in length, thickness, rigidity, aspect ratio, surface defects and reactivity, with a remarkable contribution of synthesis methods and post-treatments. Thus, CNTs are not a single substance, but a heterogeneous family of materials that elicit different biological responses and, thus, are associated with different hazard levels not simply ascribable to the fibre paradigm. Methods Cell models representative of the airway barrier were challenged with MWCNT preparations endowed with different physico-chemical properties, evaluating endpoints such as viability, expression of pro-inflammatory markers, nitric oxide production, epithelial barrier competence, clonogenic activity, genotoxicity. Epithelial-mesenchymal transition (EMT) was also assessed as an early event leading to fibrosis and, possibly, involved in neoplastic transformation. Results Only long MWCNTs promoted EMT and caused frustrated phagocytosis. On the other hand, MWCNT agglomeration led to contact-mediated focal epithelial damage and impaired barrier functionality in vitro. Functionalization with carboxyl or amino groups modified the quantity and type of proteins adsorbed and, hence, the interaction with cells. Discussion These findings may contribute to safe-by design manufacturing of MWCNT. Importantly, all the endpoints evaluated represent MIEs than can be combined to construct putative AOPs, associated with disease onset and progression. It is therefore concluded that the knowledge of the physico-chemical properties associated to the MIEs of different adverse outcomes is a pre-requisite for the toxicological profile of a MWCNT preparation. Show less

Conference Paper · Apr 2018

Request full-text

Top co-authors View all


Chiara Riganti
Università degli Studi di Torino


Ivana Fenoglio
Università degli Studi di Torino

Ovidio Bussolati
Università di Parma

Elena Gazzano
Università degli Studi di Torino


Elisabetta Aldieri
Università degli Studi di Torino


Arianna Marucco
Università degli Studi di Torino

Manfredi Allegri
Università di Parma

F Donato

E Polimeni

MG Bianchi

Top Journals

Occupational and Environmental Medicine (1)

Browse more researchers