Towards a harmonized Safety Assessment of Nanomaterials

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Abstract

Traditional toxicology´s main concern is to study the adverse effects of chemicals on a given set of known cytological, physiological and morphological parameters. However, these set of well defined studies do not take into account the special nature of nanomaterials, such as their small size, aggregation capacity and reactivity. These new properties may be able to alter the absorption and transport capacity of nanomaterials across membranes. There is also a potential for nanomaterials to accumulate in organs, enter into blood circulation or even cross the placental-foetal barrier.

One main objective of the European Project “NANoREG” is to produce a set of high quality toxicity data from a selection of industrially relevant nanomaterials with the aim to speed nanomaterial toxicity assessment. To achieve this aim the proposed strategy is two-fold; on one hand a set of standard in vitro toxicity protocols will be duly reviewed and adapted to the particulars of nanomaterials if necessary based on previous experiences from other initiatives and the Pharma industry. On the other hand, in vitro technologies will be challenged with a direct and unique comparison to in vivo data. In this regard, complex inhalation toxicity models have been included as a way to simulate inhalation toxicity in vitro. The final aim of this exercise being to assess the potential of in vitro models to predict nanotoxicity, speeding, in this way, nanomaterial toxicity assessment. Currently, an initial harmonization step has taken place focusing mainly on cell lines, dosage, incubation times, exposure mechanisms and detection techniques and covering mainly intestine, liver, lung and the immune system.

Our strategy aims at the core of engineered nanomaterial development, assisting in nanomaterial design by providing a fast and reliable evaluation of nanomaterial toxicity in the same fashion as any other conventional drugs are assessed for toxicity at their preclinical stage.

References

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