CYTOTOXICITY OF TIO2 NANOMATERIALS AS A FUNCTION OF THEIR PHYSICO-CHEMICAL PROPERTIES – GENERATION OF DATA FOR COMPUTATIONAL MODELLING

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Abstract

Uniqueness and diversity of NMs raise questions about their safety, as well as about feasible ways to assess their potential toxicity. Despite intensive nanotoxicological research, it is impossible to keep pace with the rate of development and production of new NMs. Modifications of NMs size, shape and numerous other characteristics are performed to reach desirable industrial properties. To be able to alter, or rather minimize, toxicity of NMs in the same way, we have to understand which NMs properties govern particular toxic effects. Computational modeling relating physico-chemical properties of NMs with their toxic effects holds great promise in this area, however the lack of high-quality comparable experimental data of properly characterized NMs hampers the development of reliable models.

In the present study, we evaluated cytotoxic potential of selected TiO2 nanomaterials differing in basic characteristics (crystal structure, size and shape) using three in vitro assays (MTS, WST-1, LDH) and two human lung cell lines A549 and BEAS-2B, representing suitable in vitro models for studying inhalation toxicity. TiO2 is one of the most frequently used nanomaterials. Although inert in the bulk form, some TiO2 nanoforms have been reported to elicit toxic response. Our study compares the results of cytotoxicity of several nanoTiO2 variants in relation to their physico-chemical properties. The main purpose of the study is generation of high-quality data for computational modelling of cytotoxicity (nano-QSAR).

Keywords: NanoTiO2, nanotoxicology, cytotoxicity

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