Nanotoxicology – *In Vitro* Tests for Safety Assessment of Nanomaterials

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Abstract

Current traditional toxicology studies the damage of different chemical molecules on different biological structures taking into account, mostly, the concentration value at which those molecules carry out their toxic effect. However, although the techniques used for nanomaterial toxicity elucidation are similar to those used for chemical molecules, concentration may not be the most important physico-chemical parameter to be taken into account regarding nanomaterials. Size, aggregation capacity and reactivity, surface area, etc. play an important role in nanomaterial toxicity, sometimes even higher than concentration itself. According to these facts, nanomaterial toxicity testing is not a straightforward task. It involves modification or/and adaptation of the traditional testing methods (both *in vitro* and *in vivo*) to account for those factors. Besides, it is also necessary to evaluate the intended use of the manufactured nanomaterial as body entry route (inhalatory, dermal, etc) is important to define new assays or modify the nanomaterial dosing method in already standardized assays.

At GAIKER, we work in different projects (European, like NanoReg I and Nanoreg II and national, like EHS and EHS-2) focused on the definition and optimization of the most suited *in vitro* toxicity testing methods for nanomaterials. *In vitro* cytotoxicity and genotoxicity current methods are being modified and adapted to be used with nanocapsules or nanotubes, silver, cerium or titanium nanoparticles or 20 to 100 nm diameter nanoparticles, etc. Moreover, we are developing new *in vitro* physiological barrier models that mimic the *in vivo* situations like skin barrier, blood brain barrier, pulmonary barrier, etc. to be used as experimental systems suitable for nanomaterial testing and, at the same time, providing new alternative methods for general toxicity testing.

References

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