

From nanotoxicology to nanomedicine: lessons learned from EU-funded nanosafety projects

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Nanomaterials possess unique properties that make them attractive for a variety of applications, not least in medicine (Fadeel B, Alexiou C. *Biochem Biophys Res Commun.* 2020;533(1):36-49; Fadeel B. *J Intern Med.* 2021;290(3):746-8). The successful exploitation of nanomaterials in the clinic requires the concerted efforts of those who understand the materials and those who understand the biology of human disease. The biocompatibility of any novel (nano)material must also be critically evaluated.

Nanomaterials have been widely scrutinized with respect to their potential toxicity using *in vitro* and *in vivo* models. However, a detailed understanding of the mechanism(s) of toxicity is still lacking. We have been engaged in several pan-European nanosafety projects and screened a large number of nanomaterials using primary cells or cell lines. Specifically, we aimed at understanding toxicity mechanism(s) focusing on regulated cell death. We also found that some nanomaterials elicit selective effects on normal and cancerous cells. In the present lecture some lessons learned in these projects are discussed.

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