Translocation, biological fate, stability and effective dose of engineered NMs

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There is an urgent need for a deeper understanding of the impact of engineered nanomaterials (ENMs) on human health resulting from deliberate exposure to ENMs, such as in nanomedicine, or from accidental exposure due to handling or using devices or products containing ENMs. The characteristics of ENMs, such as shape, size, degradability, aggregation, surface and core chemistry determine their interaction with biomolecules and the ENMs fate both intracellularly and at body level. Therefore, for the assessment of ENMs toxicity is necessary to correlate ENMs characteristics with the fate and biological interactions. ENMs fate *in vivo*, distribution per organ, accumulation and biodurability are fundamental to assess how ENMs affect biological functions. ENMs translocate and may finally reach the cell interior. The physical state of the ENMs, including aggregation, the interaction with biomolecules in different cellular environments, and the dynamics of ENMs will guide the intracellular action of nanomaterials.

Several aspects of ENMs fate *in vitro* and *in vivo* will be discussed. Cell uptake and intracellular fate of ENMs will be presented. The intracellular dose for metal oxides NPs will be measured with Ion Beam Microscopy. Relations between exposure dose, intracellular dose and cell viability will be established. The bio distribution, organ accumulation and fate of radiolabelled ENMs will be studied in animal models by means of Positron Emission Tomography (PET)[1]. NPs dose per organ will be evaluated. A dual radiolabellig strategy of nanoparticle core and coating is presented using gamma emitters with different energy spectra. After intravenous administration into rats, energy-discriminant Single-Photon Emission Computerised Tomography (SPECT) resolved each radioisotope independently revealing different fates in vivo for the core and coating [2].

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