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* The views expressed in this presentation are personal and may not necessarily reflect those of the European Commission.

Examples Nano-Materials

(Ron Hardman (2006), A Toxicologic Review of Quantum Dots (QDs): Toxicity Depends on Physicochemical & Environmental Factors, Environmental Health Perspectives, 114(2), pp.165-172)

Figure 1. QDs consist of a metalloid core and a cap/shell that shields the core and renders the QD bioavailable. The further addition of biocompatible coatings or functional groups can give the QD a desired bioactivity.
Toxicology Aspects of Quantum Dots (QDs) Type Nano-Materials

(Ron Hardman (2006), A Toxicologic Review of Quantum Dots (QDs): Toxicity Depends on Physicochemical & Environmental Factors, Environmental Health Perspectives, 114(2), pp.165-172)

QDs absorption, distribution, metabolism, excretion, & toxicity depends on various inherent physico-chemical properties & environmental conditions: size, charge, concentration, outer coating, bioactivity (capping material & functional groups), oxidative, photolytic, exposure duration, & mechanical stability.

Influences of different QDs coatings on stability & toxicity:

- Coating with high molecular mass (100 kDa) co-polymer & a grafted 8-carbon alkyl side chain demonstrated greater in vivo stability than those with simple polymer & amphiphilic lipid coatings.

- Silica coating can lead to no observable genotoxicity because of the prevention of interaction of Cd, Se, Zn & S with proteins & DNA in nuclei.

- Removal of tri-n-octylphosphine oxide (TOPO) type coatings is important to reduce cycto-& genotoxicity.