SEMINAIRE ISMO

Hervé SEZNEC
Centre d'Etudes Nucléaires Bordeaux, Gradignan (CENBG),
Chemin du solarium, 33175 Gradignan, France.

Molecular basis of TiO_2 nanoparticles toxicity on human cells: effect of various morphologies on cell proliferation, calcium homeostasis and reticulum stress

The explosive growth in nanotechnology has led to the nanoparticles (NPs) utilization in a wide range of applications such as therapeutics, antimicrobial agents and multimodal imaging labeling. However, the risks for adverse health effects have not been clearly established. Detecting and tracking NPs in biological systems is challenging and essential to understand the possible interactions with the living. Indeed, assessing *in situ* NPs internalization at the level of a single cell is a difficult but critical task due to their potential use in nanomedicine. Moreover, a better understanding of the *in vitro*/*in vivo* interactions of NPs with biological systems is mandatory and requires a multidisciplinary approach covering all these aspects. Here, we tested the behavior of TiO_2 NPs with 4 different shapes/morphologies: P25 (classical shape), nanosheets (NTs), nanoneedles (NNs) and Isotropic NPs (INPs). In our approach we combine a (i) well-controlled chemical synthesis and characterization of TiO_2 NPs, (ii) physicochemical analytical and imaging studies providing the subcellular localization of the NPs, (iii) quantification of intracellular TiO_2 NPs, (iv) studies of biological responses induced after NPs-exposition (cell proliferation, ion homeostasis, ER stress). Moreover, our experiments were realized using different cell types *i.e.* immortalized cell line (HeLa) *versus* primary endothelial and keratinocyte cell lines (HUVECs, HEKn).

Our results revealed that TiO_2 exposure highly altered the intracellular calcium homeostasis correlated with a decrease in cell proliferation and ER stress induction for all the NPs expect the NNs. Interestingly, the behavior of these NPs is different according to cell line and/or the associate culture medium. The differences observed will be discussed.

Mardi 29 septembre 2015 à 11h
Bât 351 – 2ème étage (Bibliothèque)
Université Paris-Sud - 91405 ORSAY Cedex