Quantitative Interaction of colloids with cells

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When cells internalized nanoparticles via endocytosis this involves also proteins bound to the surface of the nanoparticles. After internalization, the original protein corona may be partly exchanged. In case the proteins bear labels providing contrast for imaging, the in vivo distribution of the originally bound proteins as well as the one of the nanoparticles can be determined. This can be done for example with fluorescence or X-ray fluorescence based method. Colocalization analysis then provides information about the degree in which the original protein corona is retained.

Most studies about the interaction of nanoparticles (NPs) with cells are focused on how the physicochemical properties of NPs will influence their uptake by cells. However, much less is known about their potential excretion from cells. In order to control and manipulate the number of NPs in a cell however both, cellular uptake and excretion need to be studied quantitatively. Monitoring the intracellular and extracellular amount of NPs over time (after residual non-internalized NPs have been removed), enables to disentangle the influence of cell proliferation and exocytosis, which are the major pathways for the reduction of NPs per cell. Proliferation depends on the type of cells, and exocytosis depends in addition to the type of cells also on the properties of the NPs, such as their size. Examples are given on the role of these two different processes for different cells and NPs.