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Nanoparticle interactions with cells for targeting nanomedicines and understanding potential impact of nanomaterials

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Nanoparticles can enter cells easily and are trafficked actively by cells. This has opened up incredible opportunities for the potential application of nanoparticles in nanomedicine to transport drugs to specific locations. However, there is as yet little understanding on the processes involved in nanoparticle-cell interactions. Here, quantitative methods to study nanoparticle uptake and final fate inside cells and to guide the design of nanoparticles capable to target specific cell receptors will be presented. Also how the environment in which nanoparticles are found changes nanoparticle properties, affecting much of the subsequent interactions with cells will be shown. This has important consequences on nanomedicine, and also affects the impact that some nanoparticles can induce on cells. Furthermore, it was shown that cell cycle and cell division affect nanoparticle uptake and how this needs to be taken into account in order to discriminate effects of cell division from eventual nanoparticle export or degradation.

Biography

Anna Salvati has completed her PhD in Chemistry in 2007 in the University of Florence, Italy. She then worked for several years in the Centre for BioNano Interactions in Dublin, Ireland, and has recently moved to Groningen University, Netherlands as an independent PI. She has been focused on the development of quantitative methods to control and understand nanoparticle-cell interactions for both nanomedicine and nanosafety. She has currently 37 papers and her work has been highlighted in several journals, including *Nature Nanotechnology* and *Nature Reviews Drug Discovery*.

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Biosynthesis of silver nanoparticles: Elucidation of prospective mechanism and therapeutic potential

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The synthesis of silver nanoparticles (AgNPs) was accomplished using *Syzygium cumini* fruit extract at room temperature. Various techniques were used to characterize the newly synthesized silver nanoparticles and their size was determined to be 10 to 15 nm. Important findings of this study were the identification of biomolecules responsible for the synthesis of silver nanoparticles and elucidate the mechanism of biosynthesis. Flavonoids present in *Syzygium cumini* were mainly responsible for the reduction and the stabilization of nanoparticles. The antioxidant properties of AgNPs were evaluated using various assays. The nanoparticles were also found to destroy Dalton lymphoma cell lines under *in vitro* condition. Silver nanoparticles (100 µg/mL) decreased the viability of Dalton lymphoma (DL) cell lines upto 50%. The studies describing the biosynthesis of silver nanoparticles by fruit extract followed by the investigation of synthesis mechanism and anti-cancer activities may be useful for nanobiotechnology research opening a new arena in this field.

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