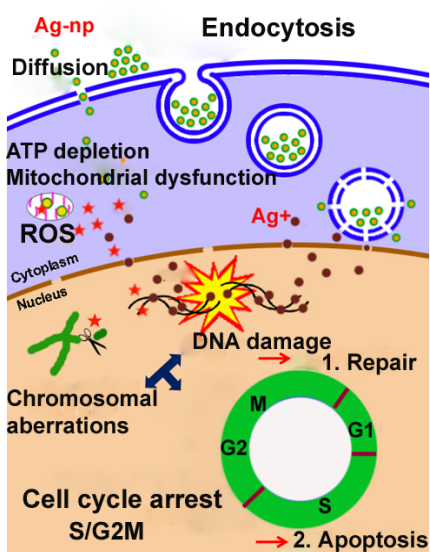


How safe is your *nano*?



Nanomaterials are being used in many commercial products, owing to their fascinating properties. However, little is known about their biological and environmental impact to living organisms. Bio-impact of nanomaterials has attracted considerable debate in recent years owing to the potential toxicity to living organisms. Recently we have investigated the toxicity of nanomaterials using a series of *in vitro* and *in vivo* studies. Human erythrocytes or red blood cells (RBCs), which constitute 99% of blood cells, perform an important function of oxygen transport and can be exposed to nanoparticles (NPs) entering into the human body during therapeutical applications involving such NPs. Hence, the haemocompatibility of

the Ag, Au, and Pt NPs on human RBCs is investigated. The parameters monitored include haemolysis, haemagglutination, erythrocyte sedimentation rate, membrane topography, and lipid peroxidation. The findings suggest that platinum and gold NPs are haemocompatible compared to Ag NPs. Erythrocytes exhibit significant lysis, haemagglutination, membrane damage, detrimental morphological variation, and cytoskeletal distortions following exposure to Ag NPs at a concentration of 100mg/mL. The haemolyzed erythrocyte fraction has the ability to induce DNA damage in nucleated cells. Hence, it is apparent that Ag NPs exhibit toxicity on RBCs and on other cells that are exposed to NP-mediated haemolyzed fractions (see also *ACS Nano*, 2009, 3 (2), 279-290). Similarly, understanding the interaction of nanoparticles with organism may be useful for developing novel drug candidates. In the cell viability experiments, PVP-capped nanoparticles were found to be less toxic (>80% viability), whereas, folic acid-capped platinum nanoparticles showed a reduced viability down to 24% after 72 h of exposure at a concentration of 100 $\mu\text{g ml}^{-1}$ for MCF7 breast cancer cells. Such toxicity, combined with the possibility to incorporate functional organic molecules as capping agents, can be used for developing new drug candidates (Yiwei Teow and Suresh Valiyaveetil, Active targeting of cancer cells using folic acid-conjugated platinum nanoparticles, *Nanoscale*, 2010, Advance Article, DOI: 10.1039/CONR00204F).