

Biocompatibility and immune response to nanoparticles: a key issue.

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Nanotechnology is finding growing applications in industry, biology, and medicine. Nanoparticles (NPs) can offer many advantages over traditional drug design and delivery, as well as toward medical diagnostics. The use of nanostructures in biomedical applications could show clear benefits, but some issues such as **toxicity and immunogenicity** must be carefully considered. In addition, as with any medical device or pharmaceutical drug intended to be used for *in vivo* biomedical application, NPs must be **sterile** and several changes can be produced during lyophilisation (Figure 1) or depending on the method of sterilization (Figure 2).

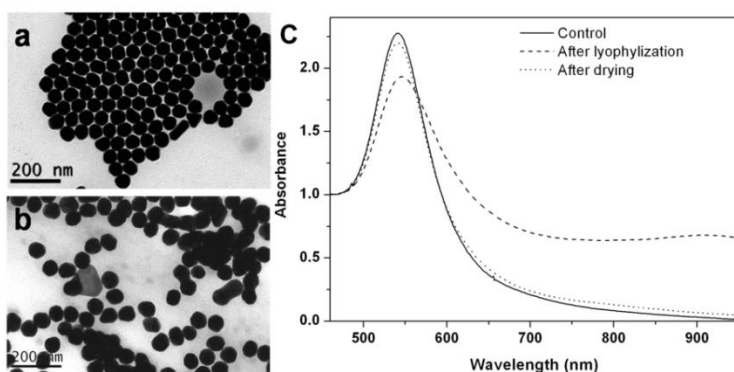


Figure 1.

TEM images of Au@PEG NPs before (a) and after (b) lyophilisation. UV-visible spectra (c) of Au@PEG NPs in PBS solution of control (solid line), after lyophilisation (dashed line) and drying (dotted line).

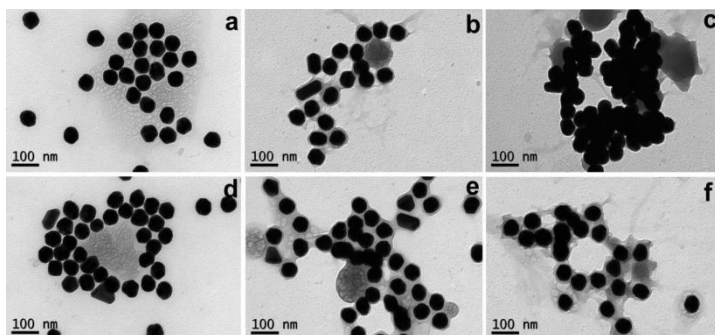


Figure 2. Representative TEM images showing the effect of the different sterilization procedures on Au@PEG NPs: a) control, b) UV, c) gas plasma, d) ethylene oxide, e) formaldehyde and f) autoclave.

Immunogenicity is another important issue. Nanoparticles can induce inflammation (complement activation, cytokine secretion, production of reactive oxygen species), activate phagocytosis and immune responses (allergy, antibody production) that it should be correctly addressed before their use *in vivo*. Finally, the conjugation of antibodies to nanoparticles can generate a product that combines the properties of both, showing versatility and specificity, but also can increase their immunogenicity.

What antibodies can offer to NPs and what NPs can offer to Abs

