In vitro hemocompatibility assessment of Near-IR-Emitting Ag2S Quantum Dots (QD)

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Quantum Dots (QDs) emitting in the Near-Infrared region (NIRQD) are relatively new but more attractive in biotechnology and medicine, than widely used visible QDs. However, heavy metal toxicity is an important concern for their parenteral applications. Recent efforts have been directed towards development of Cd, Pb and Hg free, biocompatible QDs. Hocaoglu *et al.* have recently demonstrated a single-step synthesis of cytocompatible Ag_2S-2MPA NIRQDs via direct addition of sulphur source to silver salt [1].

Till now, very few studies have assessed the hemocompatibility of QDs. Indeed, when diluted in the blood stream nanomaterials will be able to elicit several toxicological reactions, in particular: embolisation, hemolysis, cellular activation, but also several well-known biological cascades such as coagulation, complement activation, kinin/kininogen, fibrinolysis. Compared to macroscopic materials, hemoreactivity of nanoparticles may be expected to be significantly enhanced due to very high surface/volume ratio. It is therefore easy to realize that nanoparticles may significantly interact with humoral and cellular blood components of the blood [2].
Additionally, it is important to stress that the first barrier that nanoparticles encounter is the blood itself and the Reticulo-Endothelial System (RES). Because of the high efficiency of this clearance system in eliminating foreign bodies from the blood circulation, blood life-time of nanoparticles does not exceed typically seconds/minutes.
Hemocompatibility of Near-IR-Emitting Ag_2S QDs with different coating chemistries was evaluated by studying *in vitro* hemolysis, the morphology of blood cells, complement activation (C3a), and coagulation activation, through the extrinsic and intrinsic pathways. These tests were conducted according to ISO 10993 [3].

References

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