EVALUATION OF CYTOTOXICITY OF ORGANOSILICA NANOPARTICLES

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Keywords: nanoparticles, drug delivery, toxicity

Over the past few decades, nanoparticles have been attracting attention of researches in chemical, biomedical, pharmaceutical sciences, due to their unique physicochemical properties. This includes small size, large surface area, good biocompatibility and high reactivity. Among nanomaterials for biomedical application, silica nanoparticles exhibit great potential due to their straightforward synthesis, low-cost production, safety, biocompatibility and possibility to further functionalization. The most widely-used silica source for the synthesis of silica nanoparticles is tetraethoxysilane (TEOS) 1–3. The surface of silica nanoparticles can be functionalized with different molecules (e.g. antibodies, fluorescent tags), which makes these nanoparticles attractive for imaging, labelling, detection and other biological applications. However, there are no functional groups on the surface of the TEOS nanoparticles. To enable further surface functionalization, an additional step of modification is required to bring thiol-, amino- or other reactive groups to the surface. To avoid those steps, direct synthesis of organosilica nanoparticles from (3-mercaptopropyl)trimethoxysilane (MPTS) was proposed4,5. Their mucoadhesive and diffusive properties, their permeation through mucosal tissues have previously been reported6–8. In this work, we evaluated the cytotoxicity of organosilica nanoparticles synthesized from MPTS. To modulate biological properties, nanoparticles were conjugated with polyethylene glycol (PEG) of different molecular masses (750, 2000, 5000 Da). Effective PEGylation strategy for organosilica nanoparticles reported previously4. It is well known that toxicity and biodistribution depend on the nanoparticle size and surface modifications. Herein, the effect of PEGylated organosilica nanoparticles on varying cell lines studied.

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