Development of biocompatible silica shells doped with magnetic nanoparticles

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Background: The use of silica shells as a surface coating for specific cell immobilization and functionalization is considered as an effective and simple way in cell surface-engineering. The method is based on the process of biosilicification of glass sponges, which selectively absorb silica molecules. And besides, an addition of nanoparticles during coating allows functionalizing cell surface by the desired material. In this study, we investigate the influence of shell composed of silicon dioxide doped with iron oxide nanoparticles on the viability of mammalian cells.

Methods: The silica shells on the Human cervical carcinoma (Hela) cell line were fabricated as follows [1]. The method is based on the silicification of silicic acid derivatives on a positively charged layer of P(AAm-co-DADMAC) of cells. Previously it was reported that polyamines are a catalytic template for silica film formation under physiological conditions. During the process of the coating of cells by the silica derivatives, pre-synthesized magnetic nanoparticles were added. The cytotoxic potential was measured by MTT assay after complete shell formation on cells.

Results: According to the results, cells were successfully coated by silica doped with magnetic nanoparticles. The viability of treated cells was not significantly changed according to the data of MTT-assay.

Conclusion: These promising results allow us to plan further investigations in the field of nanoencapsulation of cells with the biocompatible material.

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