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Effect of Ag_2S-BSA nanoparticle size on 3T3 fibroblast cell line cytotoxicity

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Abstract

Silver sulfide nanoparticles, smaller than 5 nm, are of great interest in the biomedical field due to their improved optical properties from the quantum confinement of charge carriers. The effect of silver sulfide nanoparticles (6.4 ± 2.2, 13 ± 4.9, and 33 ± 12.5 nm) coated with BSA (bovine serum albumin) on cytotoxicity, cell proliferation (MTT assay), and cell morphology was determined in vitro using 3T3 fibroblast cell line as assay model. The synthesized Ag_2S-BSA nanoparticles were characterized by X-ray diffraction, infrared spectroscopy, and thermogravimetric analysis. Transmission electron microscopy and dynamic light scattering were used for particle size measurement. The MTT results showed a tendency to decrease cell viability with time exposure rather than concentration, in all particle's groups. A greater affectation was observed in cells incubated with smaller nanoparticles, and this is associated with a higher speed of cell uptake due to a higher content of adsorbed BSA. It was found that the largest nanoparticles (33 ± 12.5 nm) at 72 h and at higher concentration presents the same cell viability as observed with the smallest attributing it to the agglomeration of particles formed by the low stability of the sample. Regarding cell morphology, fluorescence microscopy showed good cell growth in all the nanoparticle groups, observing a slighter increase in the cell population of the sample of intermediate particle size (13 ± 4.9 nm).