

SYNTHESIS AND A549 CELLULAR UPTAKE OF LUMINESCENT GELATIN NANOPARTICLE PREPARED BY ONE AND TWO-STEP DESOLVATION METHODS

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Nanotechnology is transforming the biomedical research landscape through the introduction of a wide range of multifunctional and smart drug delivery, bioimaging, and tissue scaffolding systems. Gelatin is a promising material for preparing nanoparticles for a variety of biological applications due to its biocompatibility, biodegradability, availability, as well as its low antigenicity compared to other polymers. We used the same gelatin as in the tissue engineering work (bloom 75 and 225) to produce nanoparticles with different sizes. We have created amorphous luminescent gelatin nanoparticles for future image-guided drug delivery applications and demonstrated their uptake in lung adenocarcinoma (A549) cells. The objective of this study was to synthesize gelatin nanoparticles of different sizes using both one and two-step desolvation methods and to investigate the cellular uptake of these nanoparticles by A549 cells. Gelatin bloom 75 and 225 were labeled with fluorescein-5-isocyanate (FITC) and used to make nanoparticles using both one and two-step desolvation procedures. Several parameters were taken into consideration; isoelectric point of the gelatin, pH of the solution, type of solvent added, amount of solvent added, solution concentrations, total volume and temperature. Dynamic light scattering (DLS) was used to size the nanoparticles. Uptake of FITC-gelatin nanoparticles by A549 cells was identified by confocal microscopy. Gelatin bloom 225 prepared by both one and two-step desolvation formed bigger particle whereas gelatin bloom 75 formed smaller ones. The DLS showed a mean size of approximately 10nm. Using confocal laser scanning microscopy demonstrated that the fluorescent gelatin nanoparticles were significantly uptaken by A549 cells. In conclusion, luminescent gelatin nanoparticles were internalized by A549 cells in less than 24hrs. Also higher molecular weight gelatin (bloom 225) formed bigger particle than lower molecular or bloom gelatin (bloom 75).