Surface Functionalized Chitosan Nanoparticles for Gene Delivery

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Different delivery methods are being proposed and developed to improve the effectiveness of the therapeutic molecule in terms of targeted delivery. Gene delivery using cationic polymers like chitosan has proved to be an efficient system due to its biocompatibility and low toxicity. The cationic nanoparticles can be conveniently surface functionalized with various drugs, proteins or peptides in order to be more target specific. We have developed chitosan nanoparticles of less than 20 nm in size and functionalized them with polyethylene glycol (PEG_{5000}). Surface coating of chitosan nanoparticles with PEG renders more biocompatibility, hydrophilicity and improves the stability of the particles. The degree of substitution of PEG onto primary amines of chitosan was determined using NMR studies. The particle characterization in terms of size, surface charge and morphology was performed using Brookhaven BI-90 Particle Nanosizer and Malvern Zeta sizer and Transmission Electron Microscope at a magnification of 100K using JEOL JEM 2000FX Electron Microscope. Results obtained confirm the modification of chitosan nanoparticles with PEG and they appeared to highly monodispersed. We are currently engaged in analyzing the transfection efficiency of these nanoparticles in-vitro for gene delivery applications.

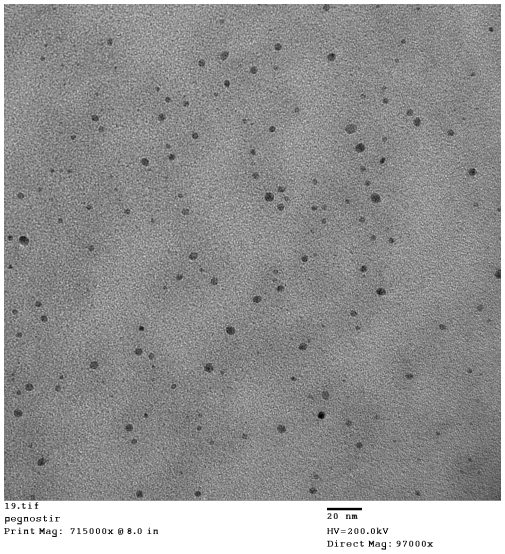

Fig1. TEM image of PEGylated chitosan nanoparticles