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Cancer cell targeting gold nanoparticles for therapeutics

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Polyethylene glycol (PEG) has promoted the prospective cancer treatment applications of gold nanoparticles (GNPs). *In vivo* stealth of GNPs coated with PEG (PEG-GNPs) takes advantage of the enhanced permeability and retention effect in tumor environments, making them suitable for targeted treatment. Because PEG minimizes gold surface exposure, PEG-GNP interaction with ligands that mediate cancer cell uptake is lower than uncoated GNPs. Hence, the cellular uptake of PEG-GNPs is significantly lower than uncoated GNPs *in vitro*. As intracellular localization of GNPs maximizes its therapeutic enhancement, there is a need to improve the uptake of PEG-GNPs. To enhance uptake, receptor mediated endocytosis peptides were conjugated with PEG-GNPs of varying core sizes. Spherical GNPs of diameters 14 nm, 50 nm and 70 nm and a PEG chain length of 2 and 5 kDa were used to determine a preferred core size and chain length for uptake *in vitro* in HeLa and MDA-MB-231 cells. Radiosensitization of HeLa cells to a 6 MVp clinical photon beam via GNP conjugates were observed to assess its therapeutic application.

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