In vivo tumor nuclear imaging with self-assembled nanoparticles : key factors and their implications

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The purpose of this study is to evaluate various self-assembled nanoparticles as candidates to shuttle radionuclide and/or drugs into tumors and to investigate the mechanisms underlying the tumor targeting with self-assembled nanoparticles. By combining different hydrophobic moieties and hydrophilic polymer backbones, various self-assembled nanoparticles were prepared, and their *in vivo* distributions in tumor-bearing mice were studied by radionuclide imaging. One type of nanoparticles (fluorescein isothiocyanate-conjugated glycol chitosan (FGC) nanoparticles) exhibited highly selective tumoral localization. The mechanisms underlying the tumor targeting with self-assembled nanoparticles were investigated in terms of the physicochemical properties of nanoparticles and tumor microenvironments. The magnitude and pattern of tumoral distribution of self-assembled nanoparticles were influenced by several key factors - i) *in vivo* colloidal stability: nanoparticles should maintain their intact nanostructures *in vivo* for a long period of time, ii) particle size, iii) intracellular uptake of nanoparticle: fast cellular uptake greatly facilitates the tumor targeting, iv) tumor angiogenesis: pathological angiogenesis permits access of nanoparticles to tumors.