

Cancer Theragnosis by Superparamagnetic Gold Nanoparticles Synthesized on Protein Particle Scaffold

조은지, 이지원[†]

고려대학교

(leejw@korea.ac.kr[†])

Cancer theragnosis with a single multimodality agent is a next key of modern cancer management, diagnosis, and therapy, but the clinically feasible agent with in vivo cancer targeting and therapeutic efficacy has not been developed yet. Here we report a new cancer theragnostic agent based on gold superparamagnetism that is induced on a cancer-targeting protein nanoparticle carrier. We synthesized a superparamagnetic gold nanoparticle cluster (named SPAuNC) on a viral capsid particle engineered to present peptide ligands targeting a tumor cell-overexpressed receptor. We observed the potent multimodality of SPAuNC that can TCR-specific targeting, T2-weighted magnetic resonance imaging, and magnetic hyperthermia therapy of subcutaneous and liver tumors in live mice under an alternating magnetic field. Further, we analytically explained how the magnetism of SPAuNC was induced between localized and delocalized spins of gold atoms. In particular, SPAuNC shows excellent biocompatibility without in vivo accumulation and holds a promising potential as a clinically effective agent for cancer theragnosis.