S10-4 Theragnostic approaches using gold nanorods and near infrared light

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Gold nanorods, rod-shaped gold nanoparticles, show two surface plasmon bands in the visible and the near infrared regions corresponding to the transverse and longitudinal surface plasmon bands, respectively. The near infrared region is ideally suited for *in vivo* bioimaging and phototherapy due to minimum light absorption of tissues. Recently, we succeeded in preparing biocompatible gold nanorods by coating PEG chain. Long lasting circulation of the PEG-modified gold nanorods was observed after intravenous injection.

The PEG-modified gold nanorods were directly injected into subcutaneous tumors in mice, then near-infrared pulsed laser light was irradiated the tumors. Significant cellular damage of the tumor and suppression of the tumor growth were observed.

To construct a targeted delivery system of the gold nanorods responding to light irradiation, we modified the gold surface with a thermo-responsive polymer gel, PNIPAM gel. After injection of the nanorods to a mouse intravenously followed by laser irradiation to right kidney, accumulation was observed in the right kidney, not in the left kidney because of phase transition of the gel layer to hydrophobic. Next, we constructed a PEG-peptide-modified gold nanorods. Since the peptide is substrate for a protease (uPA) that specifically expresses in the tumor tissue, the peptide is digested in the tumor, then the gold nanorods will accumulate in the tumor. Actually, when uPA was added to the modified gold nanorods, significant aggregation was observed.