

Thiolated dextran-coated gold nanorods for photothermal ablation of inflammatory macrophages

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Thiolated dextran-coated gold nanorods (DEX-GNRs) were synthesized for targeted delivery to inflammatory macrophages and their photothermal ablation under near infrared (NIR) light irradiation. Successful synthesis of DEX-GNRs was achieved using thiolated dextran, generated by applying mercaptopropionic acid to transform a hydroxyl group of dextran into a thiol group which has strong binding affinity with surfaces of GNRs. We confirmed that both the existence of a thiol group in the functionalized dextran using Ellman's reagent in a thiol group assay and the characteristic band of DEX-GNRs using FT-IR spectrum. Furthermore, a cellular uptake study revealed that dextran showed a superior ability to protect the GNRs surface against macrophages compared to those of PEGylated GNRs with various molecular weights of polyethyleneglycol (PEG). Consequently, an in vitro photothermal irradiation experiment using NIR light indicated that DEX-GNRs exhibited a significant cell-killing efficacy, even with a lower concentration of Au and a low-power light source.