Nanomedicines offer unprecedented opportunities to reach the objectives such as promoting the precision treatment of cancer and mitigating undesired side effects. We present a new precision cancer nanomedicine based on Bi$_2$S$_3$ nanorods (NRs) designed specifically for multispectral optoacoustic tomography (MSOT)/X-ray computed tomography (CT) guided photothermal therapy (PTT). Multimodality imaging provides PTT with real-time guidance to diagnose disease, guide procedures, monitor therapeutic response, and treat disease with greater specificity and sensitivity. The as-prepared Bi$_2$S$_3$ NRs possess ideal photothermal effect and contrast enhancement in MSOT/CT bimodal imaging. These features make them simultaneously act as ‘satellite’ and ‘precision targeted weapon’ for the visual guide to destruction of tumors in vivo, realizing effective tumor destruction and metastasis inhibition after intravenous injection. In addition, toxicity screening confirms that Bi$_2$S$_3$ NRs have well biocompatibility. This triple-modality-nanoparticle approach enables simultaneously precise cancer therapy and therapeutic monitoring.

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Bone targeting study of tetracycline grafted PLGA nanoparticles drug delivery system
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Osteoporosis is a common degenerative disease that causes bones to become abnormally thin, easily fragile, and more likely to fracture due to an imbalance in bone absorption and replacement. Nanoparticles (NPs) that target bone tissue were developed using PLGA (poly(lactic-co-glycolic acid)) copolymers in bone absorption and replacement. Nanoparticles (NPs) that target bone have well biocompatibility. This triple-modality-nanoparticle approach enables simultaneously precise cancer therapy and therapeutic monitoring.

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BSA-dextran emulsion for tumor diagnosis and therapy
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Approximately 40% of potential new drugs are restricted in clinical translations due to their poor water solubility and low bioavailability. To improve the delivery and absorption of hydrophobic drugs, various nano-carriers, such as emulsions, liposomes, micelles and nanoparticles have been developed. Among various carriers, oil-in-water emulsions have attracted particular attention because of their remarkable advantages such as high loading efficiency and good bioavailability for hydrophobic drugs. Furthermore, high pressure homogenization is a large-scale producible and reproducible method to produce nanoemulsions. Natural proteins are widely used as emulsifiers but protein emulsions are usually unstable. We used BSA-dextran conjugate as an emulsifier to produce multifunctional emulsions. The irreversible BSA oil–water interfacial film, formed by BSA gelation on heating, can avoid the coalescence of the oil droplets and also eliminate BSA anaphylaxis. The dextran surface with brush structure enables the oil droplets to be resistant to coalescence by physical forces but also allows the oil droplets to be compatible in aqueous solution and also endows the droplets with a “stealth” property to avoid rapid elimination in blood stream. In vivo investigations show that BSA-dextran emulsions are a promising system for tumor diagnosis and therapy.

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Can Nano-caged POSS cause damage to eyesight? Systematically ocular toxicity evaluation of POSS materials
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