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Activatable Near Infrared Dye Conjugated Hyaluronic Acid Based Nanoparticles as a Targeted Theranostic Agent for Enhanced Fluorescence/CT/Photoacoustic Imaging Guided Photothermal Therapy

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Targeted theranostic nano-system integrating functions of both diagnosis and therapy shows great potential for improving diagnosis and therapeutic efficacy. Herein, multifunctional nanoparticle based on activatable hyaluronic acid (HA) conjugating two near-infrared (NIR) dyes of Cy5.5 and IR825 was successfully designed and fabricated, and simultaneously used as a carrier for encapsulating perfluorooctylbromide (PFOB). In this system, PFOB showed good capability to absorb the X-rays, Cy5.5 on the outer surface acted as a fluorescent dye activatable by hyaluronidases (Hyals) in the tumor, and IR825 in the core as a photothermal agent. The obtained nanoparticles (NPs) of PFOB@IR825-HA-Cy5.5 can be utilized for triple X-ray computed tomography (CT), fluorescence and photoacoustic imaging. When PFOB@IR825-HA-Cy5.5 NPs were intravenously injected into the mice bearing HT-29 tumor, efficient tumor accumulation was clearly observed, as revealed by the triple modal