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ABSTRACT

In this work, PEG 2000N modified Fe_3O_4@carbon quantum dots (CQDs) coated single-walled carbon nanotubes (SWNTs) are fabricated and utilized as a multifunctional platform for imaging-guided collaborative treatment of cancer when the obtained agents act as dual photodynamic and photothermal effect under 808 nm laser irradiation. A model chemotherapy drug, doxorubicin (DOX), could be loaded into the pore structure of the obtained SWCNTs-PEG-Fe_3O_4@CQDs nano-carriers with high efficiency. These magnetofluorescent SWCNTs-PEG-Fe_3O_4@CQDs were conjugated with a sgc8c aptamer, denoted as SWCNTs-PEG-Fe_3O_4@CQDs-DOX-Apt, for targeting dual modalfluorescence/magnetic resonance (MR) imaging. Multifunctional SWCNTs-PEG-Fe_3O_4@CQDs-DOX-Apt had a strong effect on the targeted lung cancer cells, in the manner of inducing photodynamic and photothermal ablation, and was found to release DOX rapid following irradiation with pH/NIR laser. The current research demonstrates that SWCNTs-PEG-Fe_3O_4@CQDs-DOX-Apt nanocomposites can be used as an efficient nanoplatform for combing cancer photothermal therapy (PTT), photodynamic therapy (PDT) and chemotherapy (CT).

Keywords: carbon nanotubes, photodynamic, photothermal, sgc8c aptamer, chemotherapy