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Co-delivery of anti-cancer drugs by combination therapy

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Among many cancer therapies, chemotherapy and photodynamic therapy (PDT) have been considered in this essay. For the enhancement of the drug delivery, the use of the up-conversion material is taken into account. Under near-infrared (NIR) excitation, up-conversion emits ultraviolet light. in the traditional PDT, injecting the photosensitizer (PS), as a drug, then using illumination source like laser, light emitting diodes, arcing lamps and laser in order to active PS. Using up-conversion can help the drug to penetrate in more depth of the tumor tissue, compared to the traditional PDT, and improve the efficiency of the drug and finally the cancerous cell death. Additionally, we could assemble a core-shell nanoparticle to improve the chemotherapy as well as PDT. In regard to this, we could conjugate doxorubicin (DOX) in the shell and then (PS) in the core in order to deliver two anti-cancer. Then, the nanoparticle is PEGylated to overcome the dilemma of "protein corona". Also, using folic acid (FA) for the cancerous cell receptor, as a ligand, in the endocytosis-mediated process, we could guarantee the targeted therapy.

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