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Hollow polydopamine nanoparticles loaded ionic liquid and doxorubicin for combined chemotherapy and microwave thermal therapy of cancer

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Tumor microwave thermal therapy (MWTT) has attracted more attention owing to the minimal damage to body function, convenient manipulation and low complications. Recently, combinational therapy has been increasingly employed in the treatment of cancer. In this study, hollow polydopamine nanoparticles were developed as favorable biocompatible delivery nanoplatforms for chemotherapy and microwave thermal therapy. By loading polydopamine nanoparticles with ionic liquid, the functionalized polydopamine nanoparticles became chemotherapeutic drug nanocarriers for combinational therapy. The obvious antitumor efficacy of doxorubicin-loaded ionic liquid–polydopamine nanocomposites was demonstrated in *in vitro* and *in vivo* experiments for combined chemotherapy and microwave thermal therapy. Encouraging antitumor effect was observed when tumor bearing mice received ILs/PDA nanoparticles by intravenous injection and only single microwave irradiation. Moreover, the combination of chemotherapy with microwave thermal therapy applied to cancer therapy based on drug-loaded ionic liquid–polydopamine nanocomposites is a promising therapy for future cancer treatment in clinical applications. Furthermore, the cytotoxicity and acute toxicity study *in vivo* of PDA showed the excellent biocompatibility of ILs/PDA nanocomposites. In addition, the degradation of ILs/PDA nanocomposites in simulated body fluid illustrated the low potential hazard when they entered the blood. The emergence of PDA as a novel and feasible platform for cancer thermal therapy will promote the rapid development of microwave therapy in clinics.

Biography

Tianlong Liu has completed his PhD in 2008 from Chinese Agricultural University and Post-doctoral studies from Technical Institute of Physics and Chemistry, Chinese Academy of Sciences. He is an Associate Professor of Technical Institute of Physics and Chemistry, CAS, China. He has published more than 30 papers in reputed journals.

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