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Magnetoliposomes for hyperthermia cancer therapy

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Magnetoliposomes, hybrid nanoparticles made of superparamagnetic iron oxide nanoparticles (SPIONs) coated with liposomes, are emerging as new class of bio-nanomaterials due to their potential applications in targeted drug delivery and hyperthermia cancer therapy. Coating SPIONs with liposomes enhances their biocompatibility and dispersibility and therefore their applicability in biomedical applications. The hyperthermia treatment is based on the fact that SPIONs, when subjected to an oscillating magnetic field generate heat and thus can kill tumor cells which are more sensitive to temperature above 41 °C than the normal cells. The amount of heat generated by SPIONs is strongly dependent upon their magnetic properties, which in turn are determined by their physicochemical properties i.e., size and shape as well as coating material. Herein, we report the heating ability of bare SPIONs and core-shell type magnetoliposomes, which was measured using magnetic hyperthermia kit. SPIONs were coated with mixed lipid systems of phospholipids and cholesterol and the anticancer drug doxorubicin was encapsulated in the core-shell structure. The drug loading and release efficiency of bare and lipid coated SPIONs was also investigated. The results suggest that the drug loading efficiency increased upon lipid coating and drug release is much more controlled under the alternating magnetic field which indicates that magnetoliposomes are promising drug delivery vehicles for magnetic hyperthermia based cancer therapy.

Biography

Yogita Patil-Sen has obtained her PhD from the University of Manchester, UK and gained Postdoctoral experience at the University of Manchester and the University of Central Lancashire (UCLan). Currently, she is a Daphne Jackson Fellow at UCLan and her research is jointly funded by the Royal Society of Chemistry and UCLan. Her research interests are in the field of synthesis of different types of nanoparticles for targeted drug delivery and cancer therapy. She has published 9 research articles in high impact factor international journals. She is a Member of the Royal Society of Chemistry and the American Chemical Society.

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