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Ultrasound Enhanced Release of Active Targeting Liposomes Used for Cancer Treatment

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Abstract : Liposomes are popular lipid bilayer nanoparticles that are highly efficient in encapsulating both hydrophilic and hydrophobic therapeutic drugs. Liposomes promote a low risk controlled release of the drug avoiding the side effects of the conventional chemotherapy. One of the great potentials of liposomes is the ability to attach a wide range of ligands to their surface producing ligand-mediated active targeting of cancer tumour with limited adverse off-target effects. Ultrasound can also aid in the controlled and specified release of the drug from the liposomes by breaking it apart and releasing the drug in the specific location where the ultrasound is applied. Our research focuses on the synthesis of PEGylated liposomes (contain poly-ethylene glycol) encapsulated with the model drug calcein and studying the effect of low frequency ultrasound applied at different power densities on calcein release. In addition, moieties are attached to the surface of the liposomes for specific targeting of the cancerous cells which over-express the receptors of these moieties, ultrasound is then applied and the release results are compared with the moiety free liposomes. The results showed that attaching these moieties to the surface of the PEGylated liposomes not only enhance their active targeting but also stimulate calcein release from these liposomes.

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