Lipoproteins as a Vehicle for Targeted and Selective Delivery of Hydrophobic Drugs to Cancer Cells

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Thousands of oncologic patients and the increasing number of cancer deaths worldwide signalize an urgent need to develop new effective cancer treatments. An enhancement of the cancer treatment efficacy requires considerably increased and preferentially selective accumulation of anticancer drugs in tumor cells by active targeting. The promising and innovative cancer treatment modality, photodynamic therapy, represents a procedure which often results in a destruction of the tumor tissue while leaving healthy tissues untouched. A combination of photodynamic therapy with targeted drug delivery should further improve beneficiary effects of this cancer therapy. In order to eliminate the negative side-effects and increase the drug accumulation in targeted area, I aimed to develop a specific nano-delivery system based on LDL(HDL) lipoproteins by covering their surfaces with selected oligosaccharide (e.g. dextran). Such a coating was expected to increase the stability of the lipoprotein-drug complex and eliminate the drug redistribution from this complex to other plasma proteins. The proposed UV-VIS absorption and fluorescence experiments were directed to the study of the kinetics of incorporation and redistribution of hypericin, a photoactive hydrophobic agent utilized in the photodynamic therapy, into and from LDL(HDL)-dextran complexes. I characterized the physico-chemical properties of the complex and investigated the influence of the presence of hypericin inside LDL(HDL)-dextran complex on the thermal stability of LDL(HDL) molecules. To summarize my aspirations, I hope that by me prepared transport particles could be utilized as feasible and efficient vehicles for targeted delivery of hydrophobic drugs to cancer cells in photodynamic therapy.

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