Increasing Cancer-Specific Drug Delivery using Targeted Liposomes

Padiyath, Aadarsh

The application of biological liposomes as vesicles to be used in cancer therapy was explored. In gene therapy treatment of cancer, there are various methods using viral and polymer vectors, yet these methods create high cytotoxicity, and can often kill healthy cells. Liposomes have lower cytotoxicity and additional advantages such as lower immunogenicity, low cost and high versatility that have led to their applications and continued development for cancer therapy. Integrin receptors, particularly a5ß1 integrin, is strongly expressed on human colorectal DLD-1 cancer cells. Therefore, targeted drug carriers, such as liposomes with a5ß1 integrin specific ligands attached to its surface, can be used to efficiently bind to this overexpressed integrin. In this study, stealth liposomes, with a5ß1 integrin specific ligands were compared to nontargeted liposomes for specific cancer targeting. A fluorescent dye, calcein, loaded liposomes were used for this study. Calcein liposomes can provide a model system to study effects of liposome properties on binding and internalization in order to optimize and predict the response of therapeutic loads. In-vitro studies were conducted and liposomes, with and without integrin ligands, were used to visualize cellular uptake in DLD-1 cancer cells by fluorescence microscopy. Transfection efficiency was validated using liposome-encapsulated DNA with and without integrin ligands. The results demonstrate that calcein liposomes can be used as a model system for delivery of therapeutics to DLD-1 cells and the liposomes with integrin specific ligands had a higher binding, uptake and transfection efficiency compared to controls and have great potential for enhanced cancer therapy.

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