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Chemotherapeutic drugs, modes of delivery and efficacy

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Introduction

Chemotherapeutic drug delivery systems are continually being researched. How to deliver the drug efficiently, and how to ensure that the medication does not affect healthy tissue cells, or organs have been the subject of much research in this area. Lipid nanoparticle for therapeutic cancer delivery drugs promises more efficacy[1-4]. PEGylated drug systems and Redox-triggered mitoxantrone prodrug micelles have been evaluated by researchers for how they add effectiveness in drug delivery[5-8].

Researchers have identified that in controlling Bcl-2 which is an overexpressed anti-apoptotic gene in cancer growth, the use of lipid nanoparticles loaded G3139-GAP was more efficient for controlling the gene and reducing cancer growth[9-13]. LNPs showed better encapsulation efficiency. Bcl-2 expression was downregulated from 40 percent to 83 percent, and this was observed in the mRNA and protein levels. Lipid nanoparticle delivery did not only inhibit tumor growth and downregulated the bcl-2 expression, but also prolonged survival and influenced better prognosis[14-18]. In a similar format of investigation, it is identified that researchers have discussed the microRNA-21 (miR-21) which shows upregulation in some types of cancer. Antimi R-21 inhibits the oncomiR. LNPs helps in the efficient delivery of the AM-21. The role played by an LNP QTsome was investigated. QTsome is an amine and tertiary amine cationic lipids combined to create a unique pH responsible profile[19-22]. Studies showed that the QTsome delivered AM-21 improved the sensitivity of cells, and induced upregulation of miR-21.

PEGylated liposomes of DOX is a form of modified Doxorubicin. The modified liposomal DOC works with active targeting ligands such as antibodies, proteins, and peptides. Many studies on Pegylated drug delivery identify it as a simple modification method that can be further enhanced based on the nature of cancer growth[23-26]. Functionality can be extended, and this warrants further study of pegylated liposomes. DOX which receives a bad reputation on account of the cytotoxicity that it induces can be better administered without causing adverse health reactions on the health care client[27-31]. Many studies have argued, the advantages of PEGylated drug delivery system as being more efficient, and capable when it comes to crossing the blood-tissue barrier to reach the tumor cells. PEGylated drug systems also induct more targeted drug delivery. The use of PEG not only creates more stable drug delivery, but it also can improve the drug circulation time. This is critical for drug efficacy. The below Figure 1 represents the action of PEGylated liposomes in drug delivery.

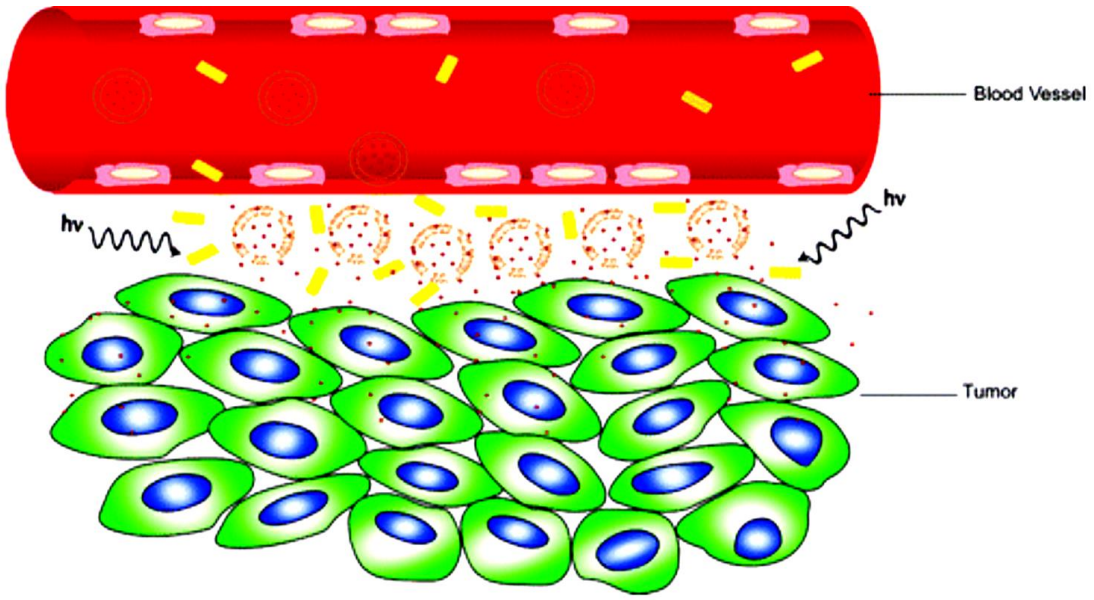

Figure 1: Pegylated liposomes in drug delivery-Schematic Illustration

Thus, the works on pegylated liposome and targeted drug delivery for cancer and the use of lipid nanoparticles for chemotherapeutic drug delivery indicate many options available for treating patients[32-36]. The diverse systems are to be considered based on the type of cancer, the current issues of cytotoxicity adverse effects and concerns like MDR that the patient might exhibit. The techniques are very promising and are some of the existing lines of investigations in cancer treatments.

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