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Future Prospects of Targeted Drug Delivery System

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INTRODUCTION

Targeted drug delivery, sometimes called smart drug delivery, is a method of delivering drugs to patients in a manner those results in higher drug concentrations in some parts of the body than in others. This delivery mode is mainly based on nano-medicine and plans to use nanoparticle-mediated drug delivery to combat the drawbacks of conventional drug delivery. These nanoparticles are loaded with drugs that target specific parts of the body where only diseased tissue resides, avoiding interaction with healthy tissue. The goal of targeted drug delivery systems is to prolong, localize, target and protect drug interactions with diseased tissues. Conventional drug delivery systems are absorption of drugs through biological membranes, whereas targeted release systems release drugs in dosage form. Targeted drug delivery systems are being developed to optimize regeneration techniques. The system is based on a procedure that delivers a specific amount of therapeutic agent to specific affected areas of the body over an extended period of time. This helps maintain the necessary plasma and tissue levels of the drug in the body, thereby preventing the drug from damaging healthy tissues. The drug delivery system is highly integrated, allowing chemists, Biologists, engineers, and many other disciplines need to work together to optimize this system.

DESCRIPTION

Active targeting of drug-loaded nanoparticles improves the efficacy of passive targeting and makes nanoparticles more specific to target sites. There are several ways to do active targeting. One way to proactively target only diseased tissue in the body is to know what receptors on cells the drug targets. Researchers can then use cell-specific ligands that allow the nanoparticles to specifically bind to cells with complementary receptors. This form of active targeting proved successful when transferrin was used as a cell-specific ligand. Transferrin has been conjugated to nanoparticles to target tumor cells that have transferrin receptor-mediated endocytic machinery on their membranes. This type of sequence was found to increase uptake compared to unbound nanoparticles.

Active targeting can also be achieved with magnetoliposomes, which are commonly used as contrast agents in magnetic resonance imaging. Magnetic positioning aids in this process by grafting onto these liposomes the drugs required for delivery to regions of the body. Additionally, nanoparticles can be activated by target-specific triggers.

Passive targeting is achieved by incorporating therapeutic agents into macromolecules or nanoparticles that passively reach the target organ. With passive targeting, drug success is directly dependent on circulation time. This is achieved by covering the nanoparticles with a kind of coating. Several substances can accomplish this, such as polyethylene glycol (PEG). Adding PEG to the surface of the nanoparticles makes them hydrophilic, allowing water molecules to hydrogen bond to the oxygen molecules on his PEG.

CONCLUSION

Targeted drug delivery can be used to treat many diseases such as cardiovascular disease and diabetes. However, the most important application of targeted drug delivery is the treatment of cancerous tumors. Passive methods of targeted tumor therapy exploit the effect of improved permeability and retention (EPR). This is a tumor-specific situation due to rapidly forming blood vessels and inadequate lymphatic drainage. The very rapid formation of blood vessels creates large windows with sizes between 100 and 600 nanometers, facilitating nanoparticle penetration.

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CONFLICT OF INTEREST

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