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Mini Review

QTsome for therapeutic delivery of miRNA for cancer

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INTRODUCTION

Treatment of some specific deadly diseases are becoming more robust in these days, cancer and psychosis are two most lethal diseases among them. Sometimes, the chemotherapeutic drugs become to be impassable through the intercellular membrane or the affected cells become multidrug resistant. To minimize these issues, the introduction of nanoparticles is the only way out. Introduction of nanoparticles with the chemotherapeutic drug is not only helping to detect the disease at an early stage but also making sure the speedy recovery of the patient¹⁻¹⁵. Hence, nanoparticles are used as the prime ingredient in the chemotherapeutic drug incorporated into the human body.

Nanoparticles are getting used in numerous ways to get the maximum positive impact from the drug. To get proper treatment in lung cancer cases therapeutic delivery of anti-miR-21 is very much necessary, but sometimes it becomes impossible for anti-miR to control the cell overexpression¹⁶⁻²⁹. Therefore, nanoparticles are incorporated with the anti-miR to get the most positive impact to stop the cell and gene overexpression. Lipid nanoparticles get conjugated with a quaternary amine to make the most effective anti-miR drug to cure lung cancer. On the other hand, lung cancer can get healed by another process of dual modulation of Bcl-2 and Akt-1. In the later, one lipid nanoparticles get conjugated with T7 peptide.

This strategy is mainly used to induce RNase H cleavage. Deoxynucleotide monomers are mostly used to build the central block of the chimeric anti-sense oligonucleotide.

According to Gapmer strategy, the antisense nucleotides (ASO) get their 2-O-methyl modification in 5 and 3 ends.

Apart from lung cancer, this process is getting used successfully for the cure and recovery of cervical cancer as well. Along with it, the process of DNA methylation and histone modification are few such processes that are working correctly to minimize the actual issues³⁰⁻⁴⁰. Doxorubicin (DOX) is one of the most effective therapeutic drugs that are mostly used liposomal doxorubicin. To ensure the active delivery of the liposomal doxorubicin peptide-based ligands is used.

As a result of "Gapmer strategy" increases the efficacy of the therapeutic drug administered into the patient's body. In the process of DNA methylation, the formation of local heterochromatin gets facilitated, and thus the cancerous cell propagation gets hindered. The method of DNA methylation and histone modification takes place at the same time because the processes are interdependent to each other. Doxorubicin (DOX) gets used mainly for the treatment purpose of malignant tumors. Leukemia and Hodgkin's Leukemia is such a malignant tumor that usually gets treated by DOX. The PEGylated liposome is unable to actively target the cancerous cells in spite of getting carried through the intercellular membranes of the human body⁴¹⁻⁴⁷. The incorporation of nanoparticles with it increases its capacity to transport the toxin parts into the tumor cells. To get the peptide ligand incorporation, some specific materials are used as the peptide base. Antibodies, proteins, small molecules are mainly used as those peptides. The cause of using these peptide ligands is the low cost, enzymatic degradation, and easy availability. Apart from this, the easy preparation procedure of these peptide ligands is another reason to choose them for the cancerous cell targeting agent⁴⁸⁻⁵¹.

Figure 1: Gapmer Strategy²³.

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