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Perspective

Design and Construction of Effective Nanocarriers for Drug Delivery Systems

Drgu Liang*

Department of Pharmacy, ISF College of Pharmacy, Punjab, India

DESCRIPTION

Drug delivery refers to the methods, sources, technologies, and solutions used to safely and securely distribute drug molecules inside the body. A wide range of materials are being studied for drug delivery and, more specifically, tumour treatment, as well as other diseases. Nanoparticles are now being used in pharmaceutical sciences to improve efficiency and decrease toxicity as well as side effects. This included a summary of the current state of certain commonly employed nanomaterials, as well as their drug delivery prospects. Nanomedicine is a branch of medicine that employs nanoscale materials, such as biocompatible nanoparticles and nanorobots, for a variety of applications, including diagnosis, delivery, sensing, and actuation in a living body [1]. Comparatively high drugs have a number of biopharmaceutical delivery issues, including limited bioaccess after oral administration, lower diffusion capacity into the outer membrane, higher intravenous dosage requirements, and prior to the typical prepared immunisation technique, there were certain unfavorable side effects. However, adding nanotechnology into the medication delivery process could solve all of these issues.

Drug designing has been a promising aspect that marks the discovery of innovative lead medications based on biological target information. The sector's growth and development, developments in experimental procedures for the categorization and purification of proteins, peptides, and biological targets, as well as advances in computer sciences, were crucial. Furthermore, there are several studies and reviews in this field that focus on the rational design of various compounds and emphasize the need of knowing different drug release mechanisms. Moreover, natural compounds can be used as inspiration for drug development with desirable physicochemical features [2].

Drug delivery technologies have also become more essential in recent years. These systems are easy to build and can promote the controlled release of active substances in the body. Chen et al, for instance, offered an intriguing evaluation of nanocarriers for imaging and sensory applications, as well as the therapeutic effects of these systems [3]. Pelaz et al. also offered an up-to-date summary of many nanocarrier uses in nanomedicine, as well as fresh potential and difficulties for this field [4]. Mattos et al. showed that neem bark extract-grafted biogenic silica nanoparticles had a lower release profile (chemical interactions) than neem bark extract-loaded biogenic silica nanoparticles [4]. As a result, all of these parameters have an impact on nanocarrier interaction.

As a nutshell, all of these characteristics have an impact on the interaction of nanocarriers with biological systems, as well as the active ingredient release kinetics in the body. Furthermore, Sethi et al. developed a Cross linkable Lipid Shell (CLS) containing docetaxel and wortmannin as archetypal drugs for manipulating drug discharge kinetics, and then investigated its discharge profile, in both *in vivo* and *in vitro* situations, which was discovered to be altered [5]. Chitosan has mucoadhesive characteristics and can be used to act in epithelial junctions that are very tight. As a consequence, chitosan-based nanoparticles are widely employed for drug delivery systems in diverse epithelia, including buccal, intestinal, nasal, ocular, and pulmonary. Silva et al. produced and tested a 0.75 percent w/w isotonic Hydroxypropyl Methylcellulose (HPMC) solution containing chitosan/sodium tripolyphosphate/hyaluronic acid nanoparticles to deliver the antibiotic ceftazidime to the eye [6].

The discovered Carbon Nanotubes (CNTs), which are nanosized, hollow, tube-like assemblages of carbon atoms. CNTs have been intensively researched as a carrier 1 for anticancer medication delivery throughout the last two decades. Anticancer medicines can be encapsulated in the inner cavity of CNTs or bonded to the surface of CNTs, either covalently or noncovalently. Furthermore, alternative targeting agents can be attached to the surface-functionalized CNTs, allowing for targeted delivery of anticancer drugs to the desired location. Methotrexate, paclitaxel, doxorubicin, cisplatin, carboplatin, and mitomycin C. are a few examples of CNTs in anticancer drug delivery [7].

CONCLUSION

Nanomedicine of carrier is one of the most exciting fields of study at the moment. Extensive research in this field over the last two decades has resulted in the filing of 1500 patents and the completion of dozens of clinical trials. Cancer appears to be the best example of a disease where nonmedical technology has aided both diagnosis and treatment, as discussed in the several researches above. The application of nanomedicine and nano-

Correspondence to: Drgu Liang, Department of Pharmacy, ISF College of Pharmacy, Punjab, India, E-mail: drguliang12@gmail.com

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drug delivery systems is unquestionably the trend that will remain the future arena of research and development by using various types of nanoparticles for the delivery of an exact amount of drug to the affected cells, such as cancer/tumor cells, without disrupting the physiology of normal cells.

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