WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Review on Targeted Drug Delivery

[1]Miss. Vaishnavi Sitaram Mohite, Pawar Rohit K.[2]

[1]Final Year Student B. Pharmacy, LNBCIOP, Raigaon, Satara.
[2]Asst. Professor, LNBCIOP, Raigaon, Satara.

ABSTRACT:

A novel approach to drug delivery called "drug targeting" seeks to deliver the medication to the intended site of action or absorption while preventing its release at any other non-target location. The medicine will remain intact in the delivery system until it reaches the target site and is released, barring any modifications. Compared to conventional drug delivery systems, targeted drug delivery systems offer various advantages, including reduced administered doses, less side effects, and increased pharmacological activity. Targeted drug delivery systems aim to administer therapeutic drugs solely to sick organs while sparing healthy organs from side effects. This is particularly important when using chemotherapeutic medicines to treat cancer. Different carriers that preserve and deliver the intact drug to a predetermined organ or tissue can be used to achieve drug targeting. Numerous carrier types, including nanotubes and nanowires, nanoshells, quantum dots, nanopores, gold nanoparticles, dendrites, noisomes, ufasomes, virosomes, cubosomes, nanobots, and transferosomes, can be used to target drugs.

Drug targeting can be accomplished through a variety of methods, including physical targeting, ligand-mediated targeting, inverse targeting, active targeting, passive targeting, dual targeting, and double targeting. A helpful delivery method for getting the therapeutic chemical to a specified location without endangering other organs is medication targeting.

Key Words: Drug targeting, Drug delivery system, Pharmacological action , Chemotherapeutical agents, Gold nanoparticle.

Introduction:

Targeted drug delivery system (TDDS) means to selectively transport drugs to targeted tissues, organs, and cells through a variety of drug carriers. It is usually designed to improve the pharmacological and therapeutic properties of conventional drugs, overcome problems such as limited solubility, drug aggregation, poor bio distribution, and lack of selectivity, control drug release carriers, and reduce normal tissue damage. With the characteristics of being nontoxic and biodegradable, it can increase the retention of drug in the lesion site and the permeability, improving the concentration of the drug in the lesion site. At present, there are some kinds of TDDS used in the test phase, such as slow controlled release drug delivery systems, targeted

Definition - Targeted drug administration, also known as smart drug delivery, is a technique for administering medication to a patient in a way that makes certain areas of their body more concentrated with the drug than others.

The benefit of medication targeting:

1 One benefit of medication targeting is that it makes the drug administration regimen simpler.

2. The medication's toxicity is reduced at a particular location.

3. A modest dosage can produce the required pharmacological effect.

4. Prevent the effect of the first pass.

5. An increase in the medication's absorption from the intended spot.

6. There was no peak or dip in plasma concentration as a result of drug targeting.

The drawbacks of medication targeting:

1. High dose frequency is caused by drugs leaving the body quickly.

2.The immune response could be triggered by the targeted medication delivery

system's carrier. 3. The medication delivery mechanism is not kept long enough at the tumour site.

4. The medications that are released and their subsequent redistribution.

5. Production, keeping, and management of the intendednd adhesion dosing systems.

The Approaching Techniques:

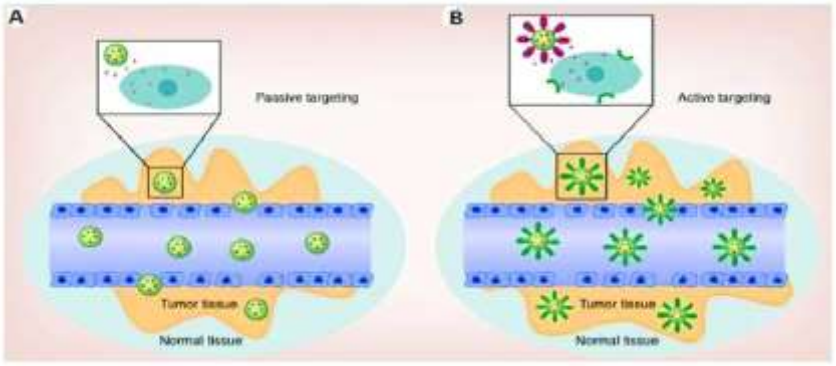
Passive or active targeting methods can be used to achieve the ability of nanoparticles to concentrate in regions of exclusively sick tissue.

1.Passive targeting

The use of passive targeting The drug's effectiveness in passive targeting is directly correlated with its circulation time. The nanoparticle is covered in a coating to do this. This can be accomplished by a number of chemicals, polyethylene glycol (PEG) being one of them. The surface of the nanoparticle is made hydrophilic by the addition of PEG, which enables water molecules to form hydrogen bonds with the oxygen molecules on PEG. This interaction causes a layer of hydration to form around the nanoparticle, which renders the material antiphagocytic. The hydrophobic interactions that are inherent to the particles give them this characteristic.

2. Active Targeting:

By making drug-loaded nanoparticles more specific to a target spot, active targeting amplifies the benefits of passive targeting. Active targeting can be carried out in multiple ways. Knowing the type of receptor on the cell that the medicine will be directed towards will help you actively target only sick tissue in the body. The nanoparticle can then bind selectively to the cell that contains the complementary receptor by using cell-specific ligands, which can be employed by researchers. It has been discovered that using transferrin as the cell-specific ligand results in successful active targeting. To specifically target tumour cells with transferrin-receptor-mediated endocytosis pathways on their surface, transferrin was conjugated to a nanoparticle.

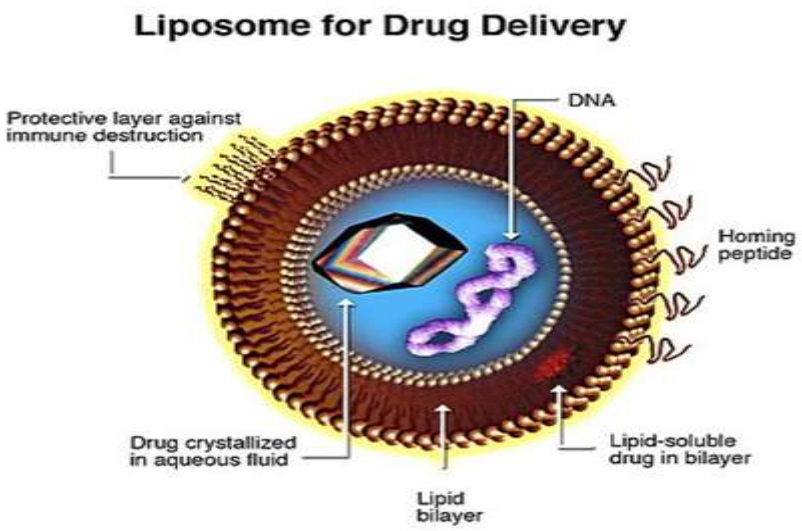


Drug delivery vehicles:

polymeric micelles, liposomes, lipoprotein-based drug carriers, nanoparticle drug carriers, dendrimers, etc. are a few examples of the various kinds of drug delivery vehicles. A drug delivery vehicle that meets all of these requirements—being non-toxic, immunogenic, biocompatible, biodegradable, and evading identification by the host's defence mechanisms—is ideal.

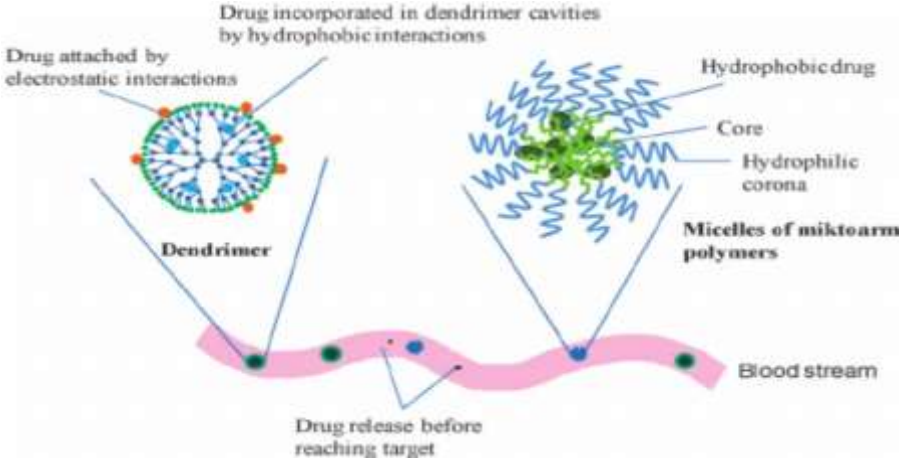
Liposomes –

Phospholipids form the composite structures known as liposomes, which may also contain trace amounts of other chemicals. Unilateral liposomes, like the ones shown here, are usually in the lower size range of liposomes, even though they can range in size from low micrometres to tens of micrometres. This is because they have different targeting ligands attached to their surface, which enables surface attachment and accumulation in pathological areas for the purpose of treating disease. The liposome is currently the most widely used vehicle for targeted medication delivery. Even after several injections, liposomes are safe, non-hemolytic, and non-immunogenic. They are also biocompatible and biodegradable and may be made to evade clearance processes including the reticuloendothelial system (RES), renal clearance, chemical or enzymatic inactivation, etc. Depending on the situation, ligand-coated, lipid-based nanocarriers can store their payload in either the hydrophilic interior or the hydrophobic exterior.



➢ Micelles and dendrimers:

Polymeric micelles are another kind of drug delivery vehicle that is employed. They are made from certain amphiphilic copolymers that have monomer units that are both hydrophilic and hydrophobic. They can be used to transport medications with low solubility. In terms of function malleability or size control, this technique offers little. Methods that generate a bigger micelle with a variety of sizes by combining hydrophobic additives with reactive polymers have been developed. Another polymer-based delivery system is dendrimers. They have a small, spherical, extremely dense nanocarrier formed by the frequent branching out of their centre.d in either the hydrophilic interior or the hydrophobic exterior.



Applications:

Targeted medication administration has the potential to treat a wide range of illnesses, including diabetes and cardiovascular conditions. On the other hand, treating malignant tumours is the most significant use of targeted medication administration. By doing this, the increased permeability and retention (EPR) effect is utilised by the passive approach to tumour targeting. This is a tumour-specific condition brought on by poorly draining lymphatic vessels and quickly growing blood vessels. Large fenestrae, ranging in size from 100 to 600 nanometers, are created when blood vessels grow so quickly, facilitating improved nanoparticle penetration. Furthermore, due to inadequate lymphatic drainage, the massive input of nanoparticles is rarely eliminated, meaning that more nanoparticles must remain in the tumour in order for treatment to be effective. Cardiovascular disease is ranked by the American Heart Association.

Conclusion:

In Conclusion, however, targeted nanoparticles have offered a useful platform for the more precise and improved delivery of cancer treatments. Multifunctional targeted nanoparticles can finally be designed with our care, desire, and diligence, with the patient's benefits in mind, to identify both the hazards and benefits of targeted nanoparticles for cancer therapy. These specific nanoparticles would be able to identify cancer cells, pinpoint their precise location within the body, and selectively deliver medication to these cells. Avoid drug resistance, eliminate cancer cells while protecting healthy cells with negligible side effects, track the results of treatment in real time, and inform patients whether they are responding well to the medication so that it can be stopped on time. Targeted nanoparticles are becoming more and more important in cancer therapy for drug delivery.

References:

1. Muller. R: Keck, C (2004). "Challenges and sohitions for the delivery of biotech drugs a review of drug nanocrystal technology and lipid nanoparticles". Journal of Biotechnology. 113 (1-3): 151-170. doi:10.1016/j.jbiotec 2004.06.007. PMID 15380654

2. Saltzman, W.Mark: Torchilin, Vladimir (2008). "Drug delivery systems" Access Science. McGraw-Hill Companies.

3. Trafton. A. Tumors Targeted Using Tiny Gold Particles. MIT Tech Talk. 2009,53,4-4.

4. BertrandN. Leroux JC Leroux (2011). "The journey of a drug carrier in the body; an anatomo-physiological perspective". Journal of Controlled Release. 161 (2): 152-63. doi:10.1016/j.jconrel.2011.09.098 PMID 22001607

5. Scott, Robert C: Crabbe, Deborah; Krynska, Barbara; Ansari, Ramin; Kiani, Mohammad F (2008) "Aiming for the heart: targeted delivery of drugs to diseased cardiac tissue". Expert Opinion on Drug Delivery. 5 (4): 459-70. doi: 10.1517/17425247.5.4.459.PMID 18426386

6. Sagnella, S.; Drummond, C. Drug Delivery: A Nanomedicine Approach. Australian Biochemist. [Online] 2012,43,5-8,20. The Australian Society for Biochemistry and Molecular Biology.

7. Vlerken, L. E. V; Vyas, T.K. Amiji, M. M. Poly(Ethylene Glycol)-Modified Nanocarriers for Tumor Targeted and Intracellular Delivery. Pharm. Res.2007.24, 1405-1414

8. Gullotti, E., Yoo, Y. Extracellularly Activated Nanocarriers: A New Paradigm of Tumor Targeted Drug Delivery. Mol. Pharm.. [Online] 2009, 6, 1041-1051. ACS Publications.

9. Galvin, P. Thompson, D.; Ryan, K. B., Mccarthy, A.. Moore, A. C.; Burke, C. S., Dyson, M. Maceraith. B.D., Gun Ko, Y.K., Byrne, M. T; Volkov, Y., Keely, C.; Keehan, E.; Howe, M.; Duffy, C.; Macloughlin, R. Nanoparticle-Based Drug Delivery: Case Studies for Cancer and Cardiovascular Applications. Cell. Mol. Life Sci. [Online] 2011, 69,389-404.

10. Noyhouzer, Tomer, L'Homme, Chloé; Beaulieu, Isabelle; Mazurkiewicz, Stephanie: Kuss, Sabine, Kraatz. Heinz-Bernhard: Canesi, Sylvain; Mauzeroll, Janine (2016-05-03). "Ferrocene-Modified Phospholipid: An Innovative Precursor for Redox-Triggered Drug Delivery Vesicles Selective to Cancer Cells". Langmuir. 32 (17): 4169-4178. doi:10.1021/acs.langmuir.6600511.ISSN 0743-7463 26987014 PMID

11. Mitra, A. K.; Kwatra, D.; Vadlapudi, A. D. Drug Delivery: Jones & Bartlett Learning: Burlington. Massachusetts, 2015,

12. Jong, W. H. D.; Borm, P.J. A. Drug Delivery and Nanoparticles: Applications and Hazards. Int. J. Nanomedicine. [Online] 2008, 3, 133-149. The National Center for Biotechnology Information.

13. He. X. Bonaparte, N. Kim, S; Acharya, B: Lee, JY:Chi, L., Lee, HJ; Paik, YK: Moon. PG; Back, MC, Lee, EK KIM JH: KIM, IS: Lee, BH (2012). "Enhanced delivery of T cells to tumor after chemotherapy using membrane-anchored, apoptosis-targeted peptide", Journal of Controlled Release 162 (6): 521-8. doi:10.1016/j.jconrel 2012.07.023 PMID 22824781.

14. Torchilin, VP "Multifunctional Nanocarriers" Adv Drug Deliv Rev 2006 Dec, 58 (14): 1532-55 doi: 10.1016/j.addr.2006.09.009

15. Cobleigh, M: Langmuir, VK: Sledge, GW: Miller, KD: Haney, L; Novotny, WF, Reimann, JD; Vassel, A (2003). "A phase I/II dose escalation trial of bevacizumab in previously treated metastatic breast cancer" Seminars in Oncology 30 (5Suppl 16): 117-24. doi:10.1053/j.seminoncol. 2003.08.013 PMID 14613032