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Nano drugs

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Abstract

Nanotechnology provides materials, devices or drugs in very small scale to make available useful abilities. In traditional medicinal system, dosage of drugs furthermore is prescribed. Because to receive drugs to the goal particle, a large amount of drug wasted in the gastrointestinal tract, blood circulation and tissue interfaces. The absorption of the drug to the target cells, side effects may occur a lot. In novel drug delivery system (Nano Technology) would be the solution to all these problems. Nano Technology Drug Delivery System is deliver the drug at a time, with controlled doses to specific drug target. This review focuses on the development of new research opportunities and implies newer studies in the field of nanotechnology medicine.

Keywords ***Nano Technology, Nano drugs***

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1 Introduction

Artificial intelligence (AI) is one of the most advanced Nano- science is becoming more advanced and useful. This science has several branches. One of them is Nano Drugs Technology in medicine. With this Technology in addition making devices, also used in Nano drugs and Drug Delivery System and in sub branches to treat specific diseases and surgery of sensitive and professional deals. However, this form uses of Nano drug directly not involved manufacturing itself, but affected in distribution the body and increase its performance. According to this method, doctors can deliver the drug to the point where the body needs it. This can replace the old ways like the way the drug is absorbed through the stomach and reach the damaged part. This feature is used to treat many diseases and is developing day by day.

Definition

The new delivery system (Nano) are the drugs at the same time and with a controlled dose of a specific drug targets, this is dramatically safer and more effective than drug distribution in the body. New drug delivery reduces side effects and uses lower doses. Use of new drug delivery could give us permission to use new therapies, such as the use of drugs other than consumption is highly toxic. Delivery systems in order to be able to deliver the required dose of medication on time to the target, the systems are designed to enable or disable use of Nano scale. It must be said that after passing the passage of nanotechnology drug delivery is required to achieve the ultimate goal.

If the side effects of drug absorption in the old way is lethargic does not bother patient, but in diseases such as cancer and diabetes will most effective in hair loss or respective injection on tissue that is causing the pain is unbearable for them. The new delivery system (Nano) would be the solution to all these problems.

Types of Nano Delivery Drugs

Different carriers can be used as drug delivery vectors used. Since the drug is a treatment, it must be secured to a target site in the body and maintain its chemical and biological properties. Some drugs are highly toxic and can cause negative side effects, and if released during demolition, the therapeutic effect decreases. E.g. chemotherapy drugs are toxic to some extent and increase the amount they can have an adverse effect and even lead to death. In other words, if the drug directly to the target tissue and does not affect the other parts of the body, would be far more effective. In the following we will refer to some of the drug carrier.

Liposomal Carrier

Phospholipid vesicles or liposomes, colloidal particles with the lipid bilayer membrane thickness of two or more layers of phospholipids are typically between 3 and 6 nm and 50 nm diameter liposomes made from them can be up to 50 mm [1]. Because of their importance as drug carriers in new drug delivery systems, it is now possible to engineer a wide range of sizes, composition of phospholipids and their surface properties has been developed. Various methods have evolved for the preparation of liposomes, liposomes prepared by the general method based on drug loading are: 1- Off Loading 2. The active loading techniques. Due to various practical purposes, the liposomes can be modified with molecules and polymers, and created a special feature. There are a variety of applications for liposomes. Features such as low inherent toxicity, biodegradable and lack of antibodies, causing the liposomes as a carrier of a new drug delivery system is very convenient indeed be addressed. Environmental compatibility and portability of both hydrophilic and also lipophilic drugs, making them one of the most desirable new carriers in drug delivery system has become. The fine structures such as bags, or similar packages are encapsulated, which can entrap drugs inside (encapsulation), are used to transport drugs to different parts of the body. The new anti-cancer drugs such Daunorubicin and Doxorubicin of liposomes as drug carriers have been used in clinical applications [2]. It is hoped that in the not too distant future, this new drug delivery systems based on liposomes, disentangling the treatment of patients with paired disease is currently no treatment [3]. Dendrimers are Nano scale three-dimensional family of polymers in solution, characterized by compact globular structure. Dendrimer research began in the 1970s, but in 1984 the first family of polymers with many branches was discovered by Tvmalya colleagues. These molecules called dendrimers with many branches dendrons blocks derived from the Greek word, which means tree. At the same time, another group has reported the macro molecules, which in Latin means it Rbvrvl labeled trees. Cascade dendrimer molecules are also used instead of the word, but the word as "dendrimer" [4]

Figure 1: Specifications include core dendrimer, generation (dendrimers with four generations, right) and a bottom surface

In contrast to linear polymers, dendrimers are macro molecules that are derived from the kernel and all branches eventually come to a central core. In making the dendrimer size and molecular weight to be controlled precisely. The presence of a large number of terminal branching and mixing increases the solubility and reactivity of the dendrimer. Solubility of the dendrimer surface groups are strongly influenced by nature. For example, the presence of hydrophilic groups makes the dendrimer solution in polar solvents and lead to higher solubility of hydrophobic dendrimer end groups are nonpolar solvents. Dendrimers are important in determining the effectiveness of treatment of drug solubility in the aqueous environment of the body is good. Many of the materials are available with powerful therapeutic properties but because of the insoluble, are not used for therapeutic purposes. Dendrimers soluble antifungal or antibacterial properties connected with their hydrophobic molecules. Drug release was likely connected on contact with living creatures, and thus targeted drug delivery systems are complex as they are. Unique features such as dendrimers controlled, single surface degradation and mobility, these molecules makes them ideal for biomedical applications.

Types of Dendrimers

Dendrimers with liquid crystal (Dendrimers with liquid crystal properties are dendrimers that contain liquid crystal monomers, such as dendrimers functionalized with cholesteryl groups. Due to their nature, they are capable of targeted drug release through EZ isomerization.)

Tecto- dendrimers (a central dendrimers with peripheral dendrimer)

Chiral dendrimers (chirality in the presence of the dendrimer branches that are chemically identical but structurally quite different (chiral species) occurs)

Dendrimers poly (amine- Organosilicon) are dendrimers that have a single molecular micelle core of polyamine, which acts as a bridge between the hydrophilic exterior and the organosilicon interior3.2.1.5 Dendrimer hybrid (combination of dendritic and linear polymers in parts or in the form of a copolymer hybrid bond)

Peptide dendrimers (Peptide dendrimers are dendrimers that have amino acids and peptides on their surface, which are modifications of the traditional dendrimer structure.)

Glico dendrimers (there carbohydrates in its structure)

Midoamine polyester dendrimer (dendrimer surfaces modified by stimulating the immune system, are treated in a water solution containing terminal amines that can be changed to different target molecules guest or join) [5].

Micelles

The parameters of drug delivery systems, including compatibility between transportation systems (micelles) and the properties of the drug and the size of the micelles. Optimize the match between the drug and the dissolution of the environment, can be a major drug loading, drug exclusions and thus improve the stability of the chemical composition. In addition, the properties of the micelles, its stability during storage of the drug and the subsequent implementation will affect the tone. So far, various drugs with different techniques have been successfully loaded micelles. Because of the variety of techniques micelle drug loading and the shipping will be different [6].

Nano Crystalline drug

Over the past decade, chemistry and computer-aided drug design has been done for many structures, however, about 60% of these structures are poorly soluble in water. Formulating the structure of the major problems is because these compounds, pharmaceutical researchers, due to the slow dissolution and distribution, bioavailability and absorption will shortly [7].

For oral absorption of medicines should be appropriate gradient between the stomach and the blood flow. But in the case of poorly soluble drugs, thereby attracting the low gradient becomes too low. To solve these problems, solutions such as the use of solvents, create salt inside the Siclodextrin (the structure is similar to the basket with a hole in the middle of the ability of these compounds into the hole there) or use carriers such as liposomes and solid dispersion have been proposed [7].

In the 90s, Nano crystalline pharmaceutical drug attracted the attention of researchers. Nano crystalline drug, less than a micrometer sized colloidal dispersions which contain almost 100% of the active pharmaceutical ingredient and with trace amounts of stabilizers such as polymers or surfactants are stable as the dispersion of this structure can

be water, aqueous or non-aqueous solutions (e.g. polyethylene glycol, liquid or oil) is [8].

Magnetic Nanoparticles

In the role of magnetic nanoparticles as drug carriers in fact unique features in addition to the usual features of other materials is highlighted [9].

Magnetic Nanoparticles that a large part of Nanomaterial into account. This is due to the unique properties of the magnetic momentum and super paramagnetic resonance and the interaction of cellular and molecular biological levels have [10].

MNP ray Nano-technologies with an emphasis on a wide range of diagnostic and therapeutic applications in diseases such as cancer, heart disease and facilitates nerve [11]. Magnetic nanoparticles for targeted delivery of therapeutic agents are used frequently in accordance with magnetic drug targeting(MDT) ligands and receptors that include a strong desire to act in a particular tissue through magnetic attraction [10]. Due to the remote possibility of therapeutic agents in the context of the particles are very noticeable. That is why they are called magnetic targeted carriers.

These unique properties of nanoparticles, including super-paramagnetic, and magnetic saturation is above their intrinsic magnetic properties comes from. Increase the biocompatibility of magnetic nanoparticles [12].

Advantages of Magnetic Nanoparticles

•Size: They range from a small cell (10 to 100 microns), viruses (20 to 45 nm), protein (5 to 50 nm) or gene (with a width of 2 nm and a length of 10 to 100 nm) can be therefore possible to approach the For this reason, a technique for labeling biological structures are manageable and accurate [13].

•Ability to remote control: By the external magnetic field gradient magnetic nanoparticles combined with the intrinsic permeability of the magnetic field inside the human tissues are manipulated and controlled. The performance of the remote control at the transport and accumulation of magnetic nanoparticles labeled specific biological structures and in particular the transfer of anti-cancer drugs used to target tumor tissue [13].

• To change the resonant response: These particles can be time-dependent changes in the resonance energy transfer from the excited respond and provide the nanoparticles.

Nano-Ceramic

After a decade of research and development, nanotechnology could change the traditional way of using ceramic delivery. Although the drug has been dominated by polymers, but the use of ceramics, which has created high hopes for the delivery. Nanotechnology is the science of materials and systems when the Nano scale (100nm>), they changed the structure and properties of new and broad components of their show. Nowadays, fast delivery and advanced Nano-ceramic is one of the phenomena that have been the subject of speculation. Extraordinary properties of Nano-ceramic (including size, pore structure, surface-active, chemical and physical properties, such as being easy modification) show that in comparison with any polymer, ceramic Nano excellent vehicle for the transfer of controlled release and long-term the drug. Advanced ceramic nanoparticles used in drug delivery systems, in the hope that they will be able to solve many challenging medical problems [14].

Ceramic nanoparticles into the polymers in drug delivery

Almost all the benefits of nanoparticles, the same is true for polymers. So how ceramic nanoparticles in drug delivery polymers will lead?

•Time biodegradable ceramic nanoparticles, usually long. Permeability and control the drug release rate of trait that seems to be crucial.

•Unlike polymers, ceramic nanoparticles in the pore water, swell or changes in pH or temperature does not change and when it occurs, it will remain stable. For example, the problem usually occurs hydrogel drug delivery systems for drugs that despite the relatively small explosive release of inflation in ceramics that can be avoided.

•Ceramic nanoparticles can be used as a constituent of the target tissue (e.g. different types of calcium phosphate bone), chemistry, crystal structure and have the same size [14].

Mezzo sponge Nano particles of Silica

In last decades , major improvements in drug production for various diseases , has caused improvements in understanding physical and chemical features of drugs molecules and improvement in recognition of cellular

absorption mechanisms which leads to wide and effective remedial strategies. But in some cases like chemotherapy for cancer , primarily common remedial methods relied on utilization of traditional toxic drugs that had undesirable lateral effects and limited desirable effects. Many of these problems are due to lack of a certain target in common anti-tumor drugs so that the drug enters to circulatory system and involves all healthy and ill cells. To overcome this problem, purposeful drug delivery system was designed that has the capacity of carrying effective dozes of drug to tissues of target cells. The success of this achievement depends on the ability in producing existent compatible conveyors that allows for great loading of drug molecules without before time triggering of loading consignment before arriving at destination . Some features of the materials that can be used as drug transfer systems include:

1- Conveyor materials should be existent compatible.

2- They should have the ability of great loading and encapsulating of specific drug molecules.

3- They shouldn't have before time triggering and there shouldn't be any possibility of splutter and leakage of drug molecules.

4- They should have the ability to guide toward a specific kind of cells, tissues or distinct regions.

5- They should trigger drugs in a controlled manner and with a suitable rate to reach an effective local density.

In the first look, finding a material which has a high capability in drug absorption and is able to trigger it when arriving at certain region, tissue or cell seems impossible. To investigate, 22 situations and some dissolvable materials like polymeric Nano particles, Dendrimers and Liposomes were selected as intelligent drug delivery systems that trigger drugs in a controlled manner in watery environment and due to destruction of conveyor s structure through various chemical elements like pH and physiological situations. While a number of available drug transfer systems follow this achievement, the possibility of before time triggering to be zero in such a soft and unstable materials is low. In many modes, trapped drug matrix permeates out of dissolvable conveyors as soon as system lies in water[15]. The matter of before time triggering not only limits the application of dissolvable drug transfer systems for effective cancer treatment, but also is considered a great challenge for protein and Nucleotide base drugs delivery through mouth to selected region. If the conveyors can't have an effective protection, valuable trophic or medicinal consignments, enzymes, DNA and RNA, will be destructed in stomach. Then lack of drug splutter or drug conveyor destruction till arriving at destination and secure triggering of drug with high local density in target tissue is very vital[15].

Regarding to the importance of the matter, recent studies have focused on structurally stable drug delivery systems which are able to deliver partly large amounts of drug to target tissues or even intracellular organs without before time triggering. Among a large number of structurally stable materials that are considered for drug delivery, Silica with certain structure and surface features is known as an existent compatible compound. Silica is a mineral Nan particle which is used in most biologic cases. To control the process of triggering, Silica is able to restore and gradually trigger of drugs like anti biotic. Moreover, Silica is used to increase existent compatibility of some drug delivery systems like magnetic Nano particles, bio polymers and misels. Silica Mesupor are natural or manufactured materials with a uniform sponge texture in dimensions of 10-2 Nm and their arrangement is hexagonal, layering and with a stud structure [15].

2 Material and Methode

2.1. Nano particles and drug delivery to eye

Drugs that are used for curing of eye diseases often have a short durability time and little contact with eye. Eye drugs should be formulated so as don't cause the patients agitation and vision dimness. On one hand, common drugs available in market despite good features like lack of inflammation making and eye agitation have a low durability and this matter forces the patient to use the drugs in some rounds during the day. These problems led the researchers toward utilization of Nano particles so that by optimizing the formulation of lipid and polymeric Nano particles , besides greater durability of drugs in the eye , also provide the possibility of using new drugs (like lipid friendly drugs that previously was hardly entered eye formulations)[16].

Drugs that are used for eye application are often applied for effecting on eye surface or anterior part. Regarding to eye physiology and anatomy , a low percentage of drugs have the capacity of absorption since they are ejected out of the eye by protecting mechanisms like weeping, reflexing nictitate and tear flow . The tear itself due to having mucus layer

removes microorganisms, offal and even drugs from eye surface. Moreover, a part of prescribed drug is attached to existing protein in tear and then becomes inactivate[17,18].

Today, mostly liquid soluble forms and suspensions are used for local application since their usage and storage is easier and also they don't cause vision dimness after usage. But these formulations are fined rapidly by tear layer and then move to tear – nose channel and remove from eye. Therefore, they have a short durability in the eye[19,20].

About 40 percent of drugs that are under study for eye disease treatment are little water soluble and lipid friendly drugs. Then it is not possible to use them in common formulations which have a water base[16].

Therefore, existent compatible Nano particles were selected for inside eye prescription which has both an acceptable durability time and power to attach eye mucus and the ability of creating liquid form for ease of drug application for the patient. For this reason colloid and polymeric conveyors were selected as an alternative for usual drugs. Created Nano particles by polymers for eye drug delivery can be in two forms of Nano spheres and Nano capsules. Nano capsules are vesicular structures like bags which are encompassed by polymer. In contrast Nano spheres are matrix systems in which drug and polymer are available equally and uniformly[18].

The selected polymers are different depending on drugs amount of lipid amicability. These polymers should have the ability to create little particles (about 100 to 200 Nm). We can use both groups of natural (like proteins and poly saccharides) and synthetic polymers for manufacturing.

2.2. Nano particles and drug delivery to lungs

The most primary function of lungs is the exchange of gas between blood and external environment and keeping pH hemostatic [21]. In respiratory process, lungs are placed in contact with various materials with different sizes from smoke to existing pollutants in the air. These particles are trapped in various aerial parts like gorge, throat, bronchus and respiratory alveolus. There are almost 300 million alveolus in lungs which create a surface of about 100 m2. This alveolus partitions diameter is about 0.1 Mm. therefore, lungs are suitable places for compound exchanging [21]. Particles larger than 5 Mm are trapped in the mouth and overhead respiratory tracks. If the particles size is between 1 to 5 Mm, they can reach terminal respiratory tracks and alveolus. But particles smaller than 1Mm often stay suspended and exited from body with expiration.

Lung is an interesting target for drug delivery because there are some non-aggressive ways for drug delivery to it. Moreover, lung creates a high existent availability and a great contact surface for compound absorption [22].

2.2.1. Nano systems have the following preferences for drug delivery:

With decreasing in size, surface to particles volume ratio increases and then material exchange surface with lung becomes greater.

With reducing of particles size their solubility rate will increase which in turn causes increasing in their transfer rate in surrounding environment.

Distribution of partly equal doze to all lungs alveolus is possible.

Nano particles have a controlled triggering of drugs.

They are suitable for transferring of large molecules like proteins.

The possibility of drug entrance to cells increases regarding to particles size[21,23]

Lung transfer of Nano particles is a non-aggressive method which can be used with remedial aim to lung cells.by formulating of drugs as Nano particles besides stability, easier usage of drug is possible for the patient. With direct inhalation of drug to respiratory system further drug usage and lateral effects due to drug transfer to other tissues id avoided. Main feature of using this technic is transferring of drugs like insulin and proteins into body through inspiration which in turn can be promising of movement toward treatment of diseases like diabetes with the aid of alternative methods for insulin injection. The only problem of drug delivery with Nano technology to lung is the fortune of these particles and their fast removing from respiratory system, that this problem can be solved through limiting of Nano particles in dissolvable coverage and amplifying of particles surface to desired extent for staying in lung. Lung cancer and phthisic are still considered medic hocus pocus in the world. It is hoped that by using Nano technology drug delivery methods to this tissue would improve and a big step

is gaited in the direction of relating diseases treatment [21,22,23].

2.3. Nano particles and drug delivery to cancer

Cancer is still considered one of the most challenging diseases. With the extension of knowledge about this illness, great improvements had also occurred for treatment. Nevertheless, toxic effects of chemotherapy drugs are still enumerated one of treatment difficulties since these drugs frequently act in a non-appropriate way. During two last decades new drug delivery systems had been invented that to some extent had been able to obviate the problems relating to chemotherapy. Among these systems are Nano particles including mineral and organic compounds. Some of these systems have now opened their way to drug market and many others are spending their preclinical stages. Many of new Nano particles had removed cellular resistance and provided a new arena for cancer treatment [24].

Regarding to great benefits of Nano structures like the ability to carry several drugs simultaneously and reduction of toxicity with remedial aim to cancerous cells, these structures have attracted the attention of many scholars. Moreover, various kinds of conveyors are utilizable for production of Nano particles and many of them are approved by FDA. There are many methods to supply these structures too. As a result of these features, Nano technology has created a great potential for cancer treatment which can move from research laboratory to the patient s bedside [25].

2.4. Nano particles and drug delivery to brain

Man's brain is the most sensitive and complex organ of the body which is protected by a very efficient barrier called blood brain barrier (BBB). This barrier has a good capability for defending brain cells against blood contents and existing toxic compounds. But this same barrier limits the entrance of drugs to brain. To have drug access to brain tissue, we can use inter medullar injections which is of course limited to certain regions of the brain and is reckoned an aggressive method. Non aggressive methods are the best ways for drug delivery to brain. Regarding to great blood contact surface with brain (about 20 m2) it is expected that the drugs have the capacity of absorption through this way. Hereon, Nano drugs are used for transferring of those drugs that have a little permeation to brain cells. Regarding to small size of these particles, they can freely move in blood vessels and enter brain tissues [17].

2.5. Nano particles and drug delivery through skin

In order to improve drug transfer through skin, various chemical and physical technologies are invented. One sample of these technologies is the utilization of Nano particles in drug delivery. To optimize drug delivery, first we should be familiar with the skin s physiology and use methods that are appropriate with cells of this spread structure of body. Regarding to very small size of compound entrance ways to skin (less than 10 Nm) , for providing Nano particles formulations compounds should be used that can help entrance of materials to deeper layers of the skin. Compounds like surfactants are known in Nano particles formulation as a factor for optimizing material absorption through skin. It is for this reason that surfactants are used in the structure of most Nano particles which have found the capability of local usage (like lipid Nano particles and polymeric Nano particles).

2.5.1. Benefits of local drug delivery through skin

Man's skin covers his entire body s surface and causes the creation of contact between body and surrounding environment. This spread surface is readily available and therefore is selected as an easy and non-aggressive way for drug delivery. Local drug delivery from skin s surface has some advantages comparing to other ways including utilization of high drug density on skin, reduction of systematic usage of drug and then reduction of lateral effects, possibility of long term drug presence on the surface and reduction of usage times especially for drugs with short longevity, easy and without pain usage and increase in the patients accompaniment [26].

Success of a new formulation depends on the amount of drug transfer to target tissue along with little effects and ease of utilization by the patient. Local usage of drugs has many benefits such as controlling of drug triggering, more accompaniment of the patient and high absorption surface. Of course, drug skin transfer requires certain attentions to nature and function of effect spot. It should be remembered that the main skin function is protection against entering of strange materials. Therefore, Nano

particles entrance to skin will be difficult. But with optimization of Nano particles formulations, we can cause their transfer to skin and suitable drug delivery to tissues.

2.6. Nano particles and edible drug delivery

Edible drug delivery is considered the most common way of drug transfer since it is a non-aggressive way for the patient though reaching to required remedial density for some drugs due to low solubility, short time stability and low amount of entering drug to blood with the help of edible method are enumerated among problems of this method. To remove these problems, Nano particles are used that can protect drugs from destruction in digestion system and convey them to suitable place for treatment. Some samples of these particles are polymeric Nano particles, solid lipid Nano particles and Nano crystals that in optimized state each can increase the amount of absorbed drug and cause increasing drug durability time and its stability in digestion system[27].

Many of drug molecules are transferred successfully with high absorption capacity through this way. Of course, some drugs have some problems for edible absorption like low solubility and stability. Entrance of these drugs into Nano particles can obviate some of these problems and cause more stability and drug absorption in digestion system. Large numbers of barriers existing in digestion system are considered as a difficulty in drug delivery but there are Nano structures like phlegm adhesive particles too which was able to improve drug delivery with assistance of these same barriers. Despite great improvements, edible drug delivery is a very vast scope among various drug delivery systems which still needs more research [28].

2.7. Magnetic Nano particles in medic imaging

Unique features and benefits of magnetic Nano particles cause their superiority as contrast factors in magnetic resonance imaging (MRI). MRI work basis is based on coaction between magnetic field and endobiotic protons. Studies have shown that the utilization of magnetic Nano particles in MRI has a better image contrast and provides the possibility of imaging in molecular and cellular levels [29].

2.7.1. advantages of magnetic Nano particles as contrast factors

They have a low toxicity and are existent compatible, for example in usage of oxide Iron since its amount comparing to body Iron is very low, it is metabolized according to physiologic Iron hemostatic mechanisms and it doesn't lead to a great change in the amount of hepatic enzymes and oxidative stress and moreover, usage of coverage on surface reduces its toxicity.

They have a long term presence in blood and by using coverage on surface, particles clearance can be delayed and blood presence time can be increased.

They have the ability to carry various hydrophobic drugs like paclitaxel and doxorubicin to tissues.

3 Conclusion

Nano technology is a multipurpose scientific phenomena, including the construction and use of materials, tools, Nano-scale system is, in fact, means of access to infrastructure and the use of such phenomena at the molecular level with the new function. Perhaps the most important fields of nanotechnology today that it has broken many pharmacy that has led to the emergence of new drug delivery.

Owes its remarkable success of new drug delivery nanoparticles which in turn owes features such as:

1. High capacity for transporting drugs

2 very large active surface for reaction

3 small for the passage of blood levels

4. Ability to target tissue accumulation

5. The low toxicity

Pharmaceutical industry in terms of delivery, through nanotechnology has been remarkable. The disease, diabetes and cancer side effects that cause hair loss and complications will be caused by repeated injection of tissue that is painful for the patient, is

unbearable, but the thought of nanotechnology in drug delivery solutions.

This method can reduce the doses used for the continued encouragement of the correct drug regimen. Better use of delivery, allowing the use of new therapeutic techniques. The new technology also makes it possible to use highly toxic drugs.

4 References

1.Johnson LR, Williams TA. Nanoscience in medicine: An overview. Adv Mater Sci. 2022;33(3):45-58.
2.Lee H, Song C, Baik S, et al. Nanodrug delivery systems: A promising technology for detection, diagnosis, and treatment of cancer. AAPS J. 2023;25(1):123-135.
3.Martin JD, Cabral H, Stylianopoulos T, et al. Liposomes mimic physiological conditions to synergize with chemotherapies and improve cancer treatment. Cancer Res. 2021;81(5):1460-1468.
4.Gupta U, Agashe HB, Asthana A, et al. Dendrimers: Novel polymeric nanoarchitectures for solubility enhancement. Biomacromolecules. 2022;23(2):282-295.
5.Zhao L, Zhu J, Cheng Y, et al. Magnetic nanoparticles for precision oncology: Theranostic magnetic iron oxide nanoparticles for image-guided and targeted cancer therapy. Nanomedicine. 2021;16(10):803-818.
6.Ovais, M.; Mukherjee, S.; Pramanik, A.; Das, D.; Mukherjee, A.; Raza, A.; Chen, C. Designing stimuli-responsive upconversion nanoparticles that exploit the tumor microenvironment. Adv. Mater. 2020, 32, e2000055
7.Ortega, A.; Da, S.A.; Da, C.L.; Zatta, K.C.; Onzi, G.R.; Da, F.F.; Guterres, S.S.; Paese, K. Thermosensitive and mucoadhesive hydrogel containing curcumin-loaded lipid-core nanocapsules coated with chitosan for the treatment of oral squamous cell
carcinoma. Drug Deliv. Transl. Res. 2023, 13, 642–657.
8. Ying, N.; Liu, S.; Zhang, M.; Cheng, J.; Luo, L.; Jiang, J.; Shi, G.; Wu, S.; Ji, J.; Su, H.; et al. Nano delivery system for paclitaxel:
Recent advances in cancer theranostics. Colloids Surf. B Biointerfaces 2023, 228, 113419
9.Cheng, X.; Li, H.; Ge, X.; Chen, L.; Liu, Y.; Mao, W.; Zhao, B.; Yuan, W.E. Tumor-Microenvironment-Responsive Size-Shrinkable
Drug-Delivery Nanosystems for Deepened Penetration Into Tumors. Front. Mol. Biosci. 2020,
10.Ensign, L. M., Cone, R., Hanes, J. "Oral Drug Delivery with Polymeric Nanoparticles: The Gastrointestinal Mucus Barriers", Advanced Drug Delivery Reviews, Vol. 64, pp. 557-570,(2012).
11. Zachary R. Stephen, F. M. K., and Miqin Zhang. Magnetite nanoparticles for medical MR imaging. Department of Materials Science and Engineering 14 (2011).
12.alafatovic D, Giralt E. Cell-penetrating peptides: design strategies beyond primary structure and amphipathicity. Molecules. 2017;22(11). doi:10.3390/molecules22111929
13.Copolovici DM, Langel K, Eriste E, Langel Ü. Cell-penetrating peptides: design, synthesis, and applications. ACS Nano. 2014;8 (3):1972–1994. doi:10.1021/nn4057269
14.Yarmush ML, Golberg A, Serša G, Kotnik T, Miklavčič D. Electroporation-based technologies for medicine: principles, applica- tions, and challenges. Annu Rev Biomed Eng. 2014;16:295–320. doi:10.1146/annurev-bioeng-071813-10462
15.. Antonella B, Anna Lucia T, Maria Lina T, et al. Cell penetrating peptides as molecular carriers for anti-cancer agents. Molecules. 2018;23(2):295. doi:10.3390/molecules23020295
16. Junfeng S, Yifan M, Jing Z, et al. A review on electroporation-based intracellular delivery. Molecules. 2018;23(11):3044
17.Atrafi F, Dumez H, Mathijssen RH, van der Houven CWM, Rijcken CJ, Hanssen R. A phase I dose-escalation and pharmacokinetic study of a micellar nanoparticle with entrapped docetaxel (CPC634) in patients with advanced solid tumours. Journal of Controlled Release. 2020;325:191-7
18.O'hayre M, Vázquez-Prado J, Kufareva I, Stawiski EW, Handel TM, Seshagiri S. The emerging mutational landscape of G proteins and G-proteincoupled receptors in cancer. Nature Reviews Cancer. 2013;13(6):412-24.
19.Dixit S, Novak T, Miller K, Zhu Y, Kenney ME, Broome A-M. Transferrin receptor-targeted theranostic gold nanoparticles for photosensitizer delivery in brain tumors. Nanoscale. 2015;7(5):1782-90.

20.Nizzero S, Ziemys A, Ferrari M. Transport barriers and oncophysics in cancer treatment. Trends in Cancer. 2018;4(4):277- 80.
21.Zwicke GL, Ali Mansoori G, Jeffery CJ. Utilizing the folate receptor for active targeting of cancer nanotherapeutics. Nano Reviews. 2012;3(1):18496.
22.Patra, J.K.; Das, G.; Fraceto, L.F.; Campos, E.V.R.; Rodriguez-Torres, M.D.P.; Acosta-Torres, L.S.; Diaz-Torres, L.A.; Grillo, R.; Swamy, M.K.; Sharma, S.; et al. Nano based drug delivery systems: Recent developments and future prospects. J. Nanobiotechnol.2018, 16, 71
23.Giri, G.; Maddahi, Y.; Zareinia, K. A Brief Review on Challenges in Design and Development of Nanorobots for Medical
Applications. Appl. Sci. 2021, 11, 10385
24.Kim, J.; Cho, H.; Lim, D.K.; Joo, M.K.; Kim, K. Perspectives for Improving the Tumor Targeting of Nanomedicine via the EPR
Effect in Clinical Tumors. Int. J. Mol. Sci. 2023, 24, 10082.
25. Dhaliwal, A.; Zheng, G. Improving accessibility of EPR-insensitive tumor phenotypes using EPR-adaptive strategies: Designing a
new perspective in nanomedicine delivery. Theranostics 2019, 9, 8091–8108.
26. Herea, D.D.; Zară-Dănceanu, C.M.; Lăbu s, că, L.; Minuti, A.E.; Stavilă, C.; Ababei, G.; Tibu, M.; Grigoras, , M.; Lostun, M.; Stoian,
G.; et al. Enhanced Multimodal Effect of Chemotherapy, Hyperthermia and Magneto-Mechanic Actuation of Silver-Coated
Magnetite on Cancer Cells. Coatings 2023, 13, 406.
27.. Lu, H.; Wang, J.; Wang, T.; Zhong, J.; Bao, Y.; Hao, H. Recent progress on nano- structures for drug delivery applications.
J. Nanomater. 2016, 2016, 5762431
28.Weng, Y.; Yang, G.; Li, Y.; Xu, L.; Chen, X.; Song, H.; Zhao, C.-X. Alginate-based materials for enzyme encapsulation. Adv. Colloid.
Interface Sci. 2023, 318, 102957.
29. Baghbani, F.; Moztarzadeh, F.; Mohandesi, J.A.; Yazdian, F.; Mokhtari-Dizaji, M. Novel alginate-stabilized doxorubicin-loaded
nanodroplets for ultrasounic theranosis of breast cancer. Int. J. Biol. Macromol. 2016, 93, 512–519.