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OVERVIEW OF NOVEL DRUG DELIVERY SYSTEM

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ABSTRACT:

An current drug's performance in terms of patient compliance, safety, and efficacy can be greatly enhanced by evolving it from a traditional form to a unique delivery mechanism. Ad transferosomes are used in the process of drug delivery, which involves the administration of a pharmaceutical ingredient to produce a therapeutic effect in people or animals.Significant progress has been made in the last few years in the creation of innovative medication delivery systems.There have been reports of bioactive materials made both naturally and artificially, including polymeric nanoparticles, nanocapsules, liposomes, phytosomes, nano emulsion, microspheres, and ethosomes.

Pharmaceutical firms are developing innovative drug delivery systems in response to the need to provide medication to patients effectively and with fewer adverse effects. This article provides an overview of new drug delivery systems and their various varieties.

INTRODUCTION:

The efficacy of a medication can be significantly impacted by the way it is administered. Certain medications have an ideal concentration range where the greatest therapeutic benefit can be obtained; dosages above or below this range may be hazardous or have no effect at all.(1) First of all This innovative tactic, which is also known as drug delivery systems, is founded on multidisciplinary methods combining molecular biology, polymer science, pharmaceuticals, and bioconjugate chemistry.

To efficiently deliver medications to the appropriate target site and maintain the optimum drug level, a drug delivery system is created. Implants, liposomes, nanoparticles, hydrogels, phytosomes, dendrimers, and liquid crystals are among the DDS that are currently being researched..(2'3,4).
Compared to conventional pharmaceuticals, herbal ones have a lower risk of side effects, are more widely accessible, are less expensive, and have longer-lasting impact on chronic lifestyle conditions. Modern drug delivery technology may enhance the benefits and decrease the side effects of certain herbs and herbal compounds when applied to herbal medicine. A unique drug delivery system is a fresh approach to delivering medication. The distribution of the medication can be regulated to act more potently and over a longer period of time by adding it to a carrier system or changing its molecular makeup. (5)

Classification:

- The microsphere Ideally, microspheres have a particle size of less than 200 μm and are characterized by their free-flowing powder form, made of proteins or synthetic polymers that are biodegradable. Polymers are the materials that are utilized to manufacture microspheres.

They are classified into two types:

1. Synthetic Polymers
2.Natural polymers Synthetic polymers are divided into two types

. • Non-biodegradable polymers
- Poly methyl methacrylate (PMMA)
- Glycerylmethacrylate
- Epoxy polymers
- Biodegradable polymers
- Lactides, Glycoside's& their co polymers
- Poly alkyl cyano acrylates
- Poly anhydrides

Advantages of Novel Drug Delivery Systems:

- It is possible to sustain the ideal therapeutic medication concentration in tissue or blood for an extended amount of time.
- Extended periods of time at predetermined release rates could be accomplished.
- A medication with a short half-life may have a longer duration.
- By focusing on the place of action, adverse consequences might be avoided.
- The medication may be discontinued or dosed less often.
- Improved patient adherence might be made sure of .(4,6)

Disadvantage:-

1) Their ability to transport non-phagocyte target tissue is restricted.
2) Cell clumping and dosage dumping are potential risks..[(7)]

Drug delivery mechanism by nanoparticles:

By targeting, retaining, and improving permeability, nanoparticles prevent the reticulo endothelial system and administer the medication locally. There are two methods that dogs that carry nanoparticles use.[(8)]

a.Surface bound:
The surface of the nanoparticles has a connection between the drug molecules.

b. Core bound:
Using this method, the drug particles are condensed into the nano pharma matrix and then delivered to the target inside the body. By adding or adding to the reaction mixture during polymerization to a solution that contains previously manufactured nano particles, drugs can be loaded onto nanoparticles. The fundamental element of the interaction between nanoparticles and therapeutic products may be chemistry, surface adsorption, or any binding or contact. The quantity Depend on the drug's and polymer's chemical structures, drug loading circumstances, drug binding, and drug-nanoparticle interaction type. [(8)].

TYPES OF NOVEL DRUG DELIVERY SYSTEM :

A) Phytosome:

"Phyto" means "plant," and "some" means "like cells." Phytosomes are lipid-compliant molecular complexes. "Phytosomes" are a novel herbal medicine delivery method that are produced by complexing polyphenolic phytoconstants with phosphatidyl choline. Phytosomes are more developed herbal products than those made with conventional herbal extracts since they are more absorbent and produce greater outcomes. Comparing phytosomes to conventional herbal extracts reveals superior pharmacokinetic and therapeutic characteristics.[4]

Method for preparation for Phytosomes[(9)]

- Phospholipids
- Dissolved in organic solvent Containing Drug/Extract.
- Solution of phospholipids in organic Solvent with drug/extract.
- Drying .
- Formation of thin film.
- Hydration.

B) Implants:

Classifications for implanted systems are numerous. "Drug implants" and "implantable drug-loaded pumps" are the two main categories that might be discussed generally. To regulate the release of the medication from the delivery system, several kinds of polymers and polymeric membranes are used in the first group, or drug implants.

A mechanical pump is used by the latter category, or implantable drug-loaded pumps, to regulate the release of the medicine. The third unusual category of implants has evolved in the wake of technological advancements in this field. A variety of administration methods are available, including transurethral injection systems for impotence, hydroxyapatite cement systems for osteomyelitis, and sustained-release intraocular systems for the treatment of glaucoma.[(10)]

C) Dendrimers:

The functionality of dendrimers with polyethylene glycol chain (PEG) provides stability and protection against the mononuclear phagocyte system (MPS). Dendrimers are symmetrical, high-branched, nanometer-sized macromolecules with a symmetrical architecture. [(11)]

D) Liquid Crystal:

The characteristics of both the liquid and solid states are combined in liquid crystals. They can have various geometries, with polar and polar-polar layers (a lamellar phase) that alternate and can hold aqueous medication solutions.[12]

E) Liposomes:

Because of their peculiar but special qualities, liposomes are mostly used in drug administration. Within the water replenishment membrane, the liposome can enter the region containing the aqueous solution. Alternatively known as a hydrophobic membrane, hydrophilic will make it difficult for it to flow through lipids. Liposomes can transport both hydrophobic and hydrophilic molecules because hydrophobic compounds can dissolve in membranes. Upon merging with more bilayers, like the cellular membrane, the molecules are transported to the site of action.[13,14

F) Nanoparticles:

It is possible to create nanoparticles chemically or biologically. Chemical synthesis techniques are linked to a number of negative consequences resulting from the surface absorption of some harmful substances. Using microbes, enzymes, fungi, and plant or plant extracts, the biological processes of nanoparticle manufacturing provide environmentally benign alternatives to chemical and physical approaches. The field of nanomedicine has great promise for advancing human illness diagnosis and therapy.

The biogenesis of nanoparticles using microbes is a method that is agreeable to the environment. The numerous biotechnology instruments could be revolutionized by nanotechnology to become more individualized, portable, affordable, safer, and simpler to use.[15]

G) Hydrogels:

Large volumes of water or biological liquids can form in three-dimensional, hydrophilic polymeric networks called hydrogels. They are employed as carriers in reservoir-based controlled release systems or in swallowable and swelling-controlled release devices to regulate the release of drugs.[16]

APPLICATION OF NOVEL DRUG DELIVERY SYSTEM :

- Medication or encapsulated bioactives may be released under regulated circumstances with NDDS.
- Without a doubt, the intended release pattern will improve the drug's pharmacokinetics and, in turn, pharmacodynamics.
- The controlled distribution of antibiotics by NDDS is a more effective approach than the conventional one for treating Helicobacter pylori.
- Similar to this, a drug's consistent and progressive release from an implant ensures patient compliance and avoids wasteful dosage adjustments.
- NDDS can be used for a variety of purposes, such as controlled and continuous medication administration. Some of these have previously been discussed in the previous sections.

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