

Novel Drug Delivery System: An Overview

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ABSTRACT

In present scenario evolution of an existing drug molecule from a old form to a novel delivery system can significantly improve its performance in terms of patient compliance, safety and efficacy. In the form of a control drug delivery system an existing drug molecule can get a new life. An appropriately designed Novel Drug Delivery System can be a major advance for solving the problems related towards the release of the drug at specific site with specific rate. The purpose for delivering drugs to patients efficiently and with fewer side effects has prompted pharmaceutical companies to engage in the development of new drug delivery system. This article covers the basic information regarding Novel Drug Delivery Systems and also advantages, factor etc.

KEYWORDS: Novel Drug Delivery System, advantages, factors influencing NDDS

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INTRODUCTION

The process by which a drug is delivered can have a significant effect on its efficacy. Few drugs have an optimum concentration range within which maximum benefit is derived, and concentrations above or below this range can be toxic or show no therapeutic benefit at all¹. On the other side, the very slow progress in the efficacy of the treatment of severe diseases, has suggested a growing need for a multidisciplinary approach to the delivery of therapeutics to targets in tissues. New ideas on controlling the pharmacokinetics, pharmacodynamics, non-specific toxicity, immunogenicity, biorecognition, and efficacy of drugs were generated. These new is technology called drug delivery systems (DDS), which are based on interdisciplinary approaches that combine polymer science, pharmaceuticals, and molecular biology. To reduce drug degradation and loss, to prevent side-effects and to increase drug bioavailability and the fraction of the drug accumulated in the required zone, various drug delivery and drug targeting systems are presently under development¹. During the last decade pharmaceutical and other scientists have carried out

extensive and intensive research in this field of drug discovery. For the purpose of drug delivery various carriers are use like soluble polymers, microparticles made of insoluble or biodegradable, natural and synthetic polymers, microcapsules, cells, cell ghosts, lipoproteins, liposomes, and micelles. The convectional drug delivery system have some limitation which are overcome by the Control Drug Delivery System.

NOVEL DRUG DELIVERY SYSTEM

Novel drug delivery system have been developed to overcome the convectional drug delivery system to meet the need of healthcare profession. These systems can characterized as Control Drug Delivery System or Targeted Drug Delivery System².

Advantages of novel drug delivery system

1. Drugs are protection from physical and chemical degradation.
2. It provide sustained delivery.
3. NDDS improved tissue macrophages distribution.
4. Enhancement of drug stability.
5. Enhancement of pharmacological activity.

6. Protection from various toxicity.
7. It improve bioavailability.
8. Improved of solubility of drugs.³

Factors affecting NDDS

1. Physicochemical characteristic of drug molecules are of the main factor of drug efficiency.
2. NDDS also depend on Route of drug administration
3. Chronic therapy
4. Site of action
5. The disease level⁴

CARRIERS

As the expanding of the field of the molecular biology and pathophysiology of diseases has expanded, more therapeutically precised and purpose specific drug are being developed. These newly prepared drug have high potency (low therapeutic window) and required their localization of the particular site of their action. In general most drugs are administrated by conventional immediate release dosage forms. They distribute freely throughout the body & accumulate the non – specific organs in an undesirable manner and thus produce adverse side effects. To reduce these slides and increased their therapeutic benefits, they should be delivered to their onsite of action, and hence suitable carrier systems becomes compulsory requirement. So many carriers have been developed for the purpose⁵. Among these colloidal carriers such as liposomes, nano particles & supra molecular system, i.e. micelles have gained more attention in the field of controlled and targeted drug delivery. Currently new carriers such as inorganic particles, liquids crystal, aquasomes, carbon nano tubes, dendrimers etc.

RECENT DEVELOPMENTS IN NOVEL DRUG DELIVERY SYSTEM⁶

1. Nanosoma
2. Liposome
3. Nisome
4. Nanoparticle
5. Microparticle
6. Microencapsulation
7. Nanosuspension
8. Micelles

NANOSOME

Nanosome are essentially non-ionic surfactant based on multilamellar or unilamellar vesicles in which an aqueous solution of solute is entirely enclosed by a membrane resulted from the organization of surfactant micromolecules as bilayers⁷.

LIPOSOME

A liposome is a minute spherical sac of phospholipid molecules enclosed a water droplet, especially as formed artificially to carry drugs into tissues⁸.

NIOSOME

Niosomes are vesicles consisting of an aqueous core enclosed in a bi layer consisting of cholesterol and one or more nonionic surfactants⁹.

NANOPARTICLE

Nanoparticles are colloidal drug delivery system which are formulated by natural, synthetic, and semi synthetic polymers. Particle size of nanoparticle ranges from 10 nm to 1,000 nm in diameter. The colloidal drug delivery system shows different inner structure¹⁰.

MICROPARTICLE

Microparticles are defined as particulate dispersions or solid particles with a size in the range of 1-1000 µm. The drug is dissolved, entrapped, encapsulated or attached to a microparticle matrix¹¹.

MICROENCAPSULATION

Microencapsulation is a process by which solids, liquids or even gases may be enclosed in microscopic particles by formation of thin coatings of outer surfaces material around the substances¹².

NANOSUSPENSION

Nanosuspension is defined as very finely dispersed solid drug particles in an aqueous or organic vehicle for either oral and topical use or parenteral and pulmonary administration¹³.

MICELLES

Micelles are amphiphilic and self-assemble into a nanoscale spherical structure in aqueous solution. These micelles encapsulate hydrophobic drugs in their hydrophobic core. Micelles have become a good choice for enhancing the solubility of DTX in the blood¹⁴.

DISADVANTAGES OF NDDS¹⁵

1. The immune reactions can be occurred against intravenous administered carrier systems
2. Requires highly sophisticated technology for the formulation of NDDS drugs
3. requires skilled man power for manufacturing, storage and administration
4. Difficult to maintain stability of dosage forms
5. Drug loading can be slow
6. Dose dumping can occure

CONCLUSION

Novel Drug Delivery System is a valuable gift of modern day pharmaceutical science which can cover up the limitations of convectional process of dosage form. All though the Control Drug Delivery System has various advantages but there are some limitations in certain cases. In present time microencapsulation, nanopartical, nanosome etc. technology took one step forward to the pharmaceutical science.

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