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Liposomes

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ABSTRACT :-

Liposomes are those spherical vesical that are composed of one or more phospholipid bi-layers. They are also used in drug delivery system due to their good Biocompatibilty,ability to encapsulate both Hydrophilic and hydrophobic drugs. They are emerged as powerful tool in drug delivery system. They have versatile drug delivery system with Biocompatibility and Biodegradability. They are composed of both Hydrophilic and Hydrophobic molecules. They are also used in various therapeutic applications. They are formed by self assembly of Amphiphilic lipids in water creating a spherical vesicle. They can be composed of natural or synthetically lipids. They can be used in various disease like cancer therapy, gene therapy, infection treatment, vaccine development etc. Liposomes can exhibit better properties including site targeting, controlled release, superior therapeutic effects, protection of drug from degradation and also low toxic effect.

KEYWORDS :- LIPOSOMES, LIPOSOMES DRUG DELIVERY SYSTEM.

INTRODUCTION :-

Liposomes is a Greek word which is composed of two words (LIPO) and (SOMES) the word ‘lipo’ means fat and ‘Somes' means body. It was firstly described by Dr. A.D.Binghnam in 1965.Liposomes are the simple microscopic vesicles in which an aqueous volume is entirely enclosed by a membrane composed of lipid molecule. Liposomes are widely used in the drug delivery due to their ability to encapsulate both Hydrophilic and hydrophobic substance. Liposomes are water soluble as well as fat soluble substance. Liposomes are also used in various cosmetic, vaccines and Diagnostic imaging. Liposomes have good Biocompatibility and versatility. They are a valuable tool in pharmaceutical and biomedical research. They also protect drugs from Degradation. Liposomal formulation have used in mRNA Covid 19 vaccine. Liposomes are also used to improve skin from penetration. They are also biodegradable and also reduce toxicity of various drugs.

Application :-

There are various application of liposomes as drugs .

1. Liposomes have controlled and sustained drug release.
2. Liposomes can enhance the drug solubility. e.g. Minoxidil.
3. Liposomes can also protect the sensitive drug molecules.
4. Liposomes are used as carriers to antigen.
5. Liposomes are also used as pulmonary drug delivery system.
6. Liposomes are also used for ocular drug delivery.
7. Liposomes are also used in the preparation of semisolid drug for topical drug delivery.
8. Liposomes are also used in Ophthalmic drug delivery system.
9. They are also used in enzymes immobilization and bioreactor technology.
10. Liposomes are also used as radio diagnostic carriers.

ADVANTAGES :-

There are various advantages of liposomes some of the common advantages of liposomes are ,

1. Liposomes can provide selective passive targeting to the tumour tissues.

2. They can used in Cancer therapy, Gene therapy.
3. They have high efficiency and therapeutic index.
4. Liposomes can increase stability of the drug.
5. Liposomes can used in the reduction of toxicity of encapsulate agent.
6. Liposomes are Biocompatible.
7. Liposomes are good biodegradable.
8. Liposomes are non toxic agents.
9. Liposomes can improve Pharmacokinetic effect.
10. Liposomes can enhance the drug solubility.
11. Liposomes are also used in the protection of sensitive drug molecules.
12. Liposomes are also used as a carrier to antigens.

DISADVANTAGES :-

There are various disadvantages of liposomes and some of common disadvantages of liposomes are ,

1. Liposomes have high production cost.
2. Liposomes are less stable.
3. Liposomes have low stability.
4. Liposomes have short half life.
5. Liposomes have oxidation and hydrolysis of phospholipid.
6. Liposomes have leakage and fusion of encapsulated drug molecules.

CHARACTERIZATION OF LIPOSOMES:-

Characterization of liposomes are of three types,

1. Physical Characterization.
2. Chemical Characterization.
3. Biological Characterization.

METHOD OF PREPARATION:-

Liposomes can be prepared by two techniques which are mentioned below :-

1. Passive loading techniques.
    A. Mechanical depression method.
    B. Solvent depression method.
    C. Detergent removal method.
2. Active loading techniques. :- In this technique ions and Hydrophilic molecules can’t cross the bilayers. Weak acid and weak bases are transported by Gradient and potential difference.

CLASSIFICATION:-

Liposomes are generally classified into three types ;

1. Based on size and number of bi-layers.
    A. Small size vesicle

•Size 20-100nm

•Single lipid bi-layers.

B. Large Size vesicle

•Size greater than 100nm

•It has greater aqueous volume.

C. Multilamellar Vesicle

•Size 500-5000nm

•Easy to prepare.

•Less efficient in drug loading.

2. Based on surface charge .

A. Neutral liposomes

•Less interaction with cell and proteins.

B. Anionic liposomes

• Contains negative charge lipids.

3. Based on composition and functionality .

A. Conventional liposomes

• It is rapidly cleared by the immune system.

B. Targeted liposomes

•It is bind specifically to targeted cell.

CONCLUSION :-

Liposomes are the versatile that have closed in the drug delivery system. Liposomes are used in various diseases like Cancer therapy, gene therapy etc. Liposomes are used in broad range of pharmaceutical applications. Liposomes promote targeting of particular diseased cell at the site. They can reduce the toxicity and improve the compatibility. They have both Hydrophilic and hydrophobic nature. Liposomes are both fat soluble as well as water soluble. Liposomes are commonly used in the drug delivery system. Liposomes are versatile Nano carriers. They offer significant potential in the delivery of drugs mainly for targeted therapies because of their Biodegradability, Biocompatibility and they have ability to encapsulate most of drugs . They also allow surface modifications for improved target and release.

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