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Opinion

Liposomes and Its Mechanism

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A liposome is a spherical vesicle having at least one lipid bilayer. The liposome can be used as a drug delivery vehicle for administration of nutrients and pharmaceutical drugs, such as lipid nanoparticles in mRNA vaccines, and DNA vaccines. Liposomes can be prepared by disrupting biological membranes. Liposomes are most often composed of phospholipids, especially phosphatidylcholine [1].

They are compatible with lipid bilayer structure. A liposome design may employ surface ligands for attaching to unhealthy tissue. The major types of liposomes are the multilamellar vesicle (MLV, with several lamellar phase lipid bilayers), the small unilamellar liposome vesicle the Large Unilamellar Vesicle (LUV), and the cochleate vesicle. A less desirable form is multivesicular liposomes in which one vesicle contains one or more smaller vesicles. Liposomes should not be confused with lysosomes, or with micelles and reverse micelles composed of monolayers.

Liposomes are extensively used as carriers for numerous molecules in cosmetic and pharmaceutical industries. Additionally, food and farming industries have extensively studied the use of liposome encapsulation to grow delivery systems that can entrap unstable compounds (for example, antimicrobials, antioxidants, flavors and bioactive elements) and shield their functionality. Liposomes can trap both hydrophobic and hydrophilic compounds, avoid decomposition of the entrapped combinations, and release the entrapped at designated targets. Liposomal encapsulation technology (LET) is the newest delivery technique used by medical investigators to transmit drugs that act as curative promoters to the assured body organs. This form of delivery system proposal targeted the delivery of vital combinations to the body. LET is a method of generating sub-microscopic foams called liposomes, which encapsulate numerous materials.

These 'liposomes' form a barrier around their contents, which is resistant to enzymes in the mouth and stomach, alkaline solutions, digestive juices, bile salts, and intestinal flora that are generated in the human body, as well as free radicals. A liposome has an aqueous solution core surrounded by a hydrophobic membrane, in the form of a lipid bilayer; hydrophilic solutes dissolved in the core cannot readily pass through the bilayer. Hydrophobic chemicals associate with the bilayer. A liposome can be hence loaded with hydrophobic and/or hydrophilic molecules. To deliver the molecules to a site of action, the lipid bilayer can fuse with other bilayers such as the cell membrane, thus delivering the liposome contents; this is a complex and non-spontaneous event, however [2]. By preparing liposomes in a solution of DNA or drugs (which would normally be unable to diffuse through the membrane) they can be (indiscriminately) delivered past the lipid bilayer, but are then typically distributed non-homogeneously.

Liposomes are used as models for artificial cells. Liposomes can also be designed to deliver drugs in other

ways. Liposomes that contain low (or high) pH can be constructed such that dissolved aqueous drugs will be charged in solution (i.e., the pH is outside the drug's pI range). As the pH naturally neutralizes within the liposome, the drug will also be neutralized, allowing it to freely pass through a membrane. These liposomes work to deliver drug by diffusion rather than by direct cell fusion. A similar approach can be exploited in the biodetoxification of drugs by injecting empty liposomes with a transmembrane pH gradient. In this case the vesicles act as sinks to scavenge the drug in the blood circulation and prevent its toxic effect. Another strategy for liposome drug delivery is to target endocytosis events autonomous endocytosis and phagocytosis. For example antisense oligonucleotides.

Autonomous endocytosis and phagocytosis. Particles, which are disguised by the cell layer, are endocytosed by the early endosomes pathway. They may advance later to endosomes and lysosomes structure, or enhance an existing biologicaly structure.

Advances in liposome design are leading to new applications for the delivery of new biotechnology products, for example antisense oligonucleotides, cloned genes, and recombinant proteins. A vast literature define the viability of formulating wide range of conservative drugs in liposomes, frequently resultant in improved therapeutic activity and/or reduced toxicity compared with the free drug. Recent improvements include liposomal formulations of all-trans-retinoic which has received Food and Drug Administration consent as a first-line treatment of AIDS-related advanced Kaposi's sarcoma [3].

Distinguished examples are vincristine, doxorubicin, and amphotericin B as a whole, changed pharmacokinetics for liposomal drugs can lead to improved drug bioavailability to particular target cells that live in the circulation, or more prominently, to extravascular disease sites, for example, tumors.

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