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Structure of Liposomes and its Medical Applications

Arthur Meng*

Department of Chemical & Biomolecular Engineering, University of Tennessee Knoxville, Knoxville, USA

Commentary

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***For Correspondence:**
Arthur Meng, Department of Chemical & Biomolecular Engineering, University of Tennessee Knoxville, Knoxville, TN, 37996, USA

E-mail: Meng564@gmail.edu

ABOUT THE STUDY

Liposomes are small vesicles with one or more phospholipid bilayer membranes that are spherically structured. Liposomes' inner core is made up of hydrophilic phospholipid sections into which hydrophilic substances can be inserted. Lipophilic compounds, on the other hand, tend to stay in the lipid section of the phospholipid bilayer.

There are many different varieties of liposomes; the differences between them are primarily due to the lipid content of the liposome structure, the size and dimensions of the vesicle, and the charge on the liposome's surface. Oral drug delivery methods, as well as the oral delivery of therapeutic proteins and peptides, have been studied, primarily for the oral delivery of the insulin hormone.

The advantages of liposomes in the oral delivery of insulin hormone are primarily their protection against enzymatic breakdown by GIT enzymes and their ability to improve insulin hormone absorption in the small intestine. Insulin is protected by liposomes because it is encased in the internal section of the liposome structure, making it inaccessible to the GIT's proteolysis enzymes.

Liposome technology has had a variety of successful uses in the pharmaceutical and cosmetics industries, but it has only seen limited growth in the food industry. This paper opens with a discussion of liposome production procedures and mechanisms, as well as the structures of liposomes created using various ways. It then goes over their physicochemical qualities as well as the science of employing liposomes to encapsulate bioactive chemicals. Liposome uses in food systems, as well as digestion and absorption behaviour of liposomes in the gastro-intestinal tract.

Various liposomes for various uses: Liposomes can be made using a variety of techniques. Dimensions, content, charge, and structure may all differ. Gregoriadis is recommended for a full overview of liposome technology and chemistry.

Liposome features have a significant impact on their *in vivo* dispersion. Covalent attachment of monoclonal antibodies or other suitable proteins to the outer surface of liposomes can be used to target liposome-encapsulated medicines to specific cells or tissues. Incorporating the phospholipid molecule phosphatidylethanolamine in the phospholipid bilayers is one method of making such immunoliposomes. The amino groups on this molecule can be used to form covalent bonds with protein molecules.

When typical liposomes are supplied to mammals, the majority of them naturally undergo phagocytosis. As a result, liposome-mediated macrophage function modification is one of liposome's *in vivo* applications. Immunomodulatory compounds encapsulated in liposomes, such as Muramyl Dipeptide (MDP) and Muramyl Tripeptide (MPT), can be used to activate macrophages, which can subsequently remove metastatic tumour cells and have a greater ability to eliminate other bacteria. It's unclear whether activated macrophages kill these cells and microbes directly or through the impact of other cells like Natural Killer (NK) cells.

Some liposome-encapsulated medicines, on the other hand, can be used to limit macrophage activity or even to entirely deplete macrophages from tissues or organs. This method is increasingly being used in research aiming at understanding macrophage functions *in vivo*.

Liposomes having lengthy half-lives in the circulation can be used to limit or even eliminate absorption and clearance by macrophages when used as a drug depot (storage and progressive release) or when liposomes are used to target pharmaceuticals to nonphagocytic cells.