NOVA MEDICINE AND HEALTH

LIPOSOMES

Advances in Research and Applications

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Chapter 1

Liposomes: History, Properties, and Applications

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Abstract

The use of liposomes in nanotechnology has become more widespread in recent years. Liposomes are self-assembled particles having a water chamber that is surrounded by a lipid bilayer. This chapter has covered the liposomes in great detail, including how and where they were created, a broad description of their structure, and what distinct types of lipids they are composed of. Depending on their size, liposomes can be classified into several distinct varieties, such as enormous liposomes, multilamellar liposomes, and unilamellar liposomes. Depending on the context, different liposomes can be produced using various preparation techniques. In this chapter, we have also learned about the several fields in which liposomes have been extensively employed for the treatment of various diseases, biotechnology research, cosmetic items, nutraceuticals, and food. To increase the stability of the core, liposomes are important in the encapsulation of a variety of bioactive compounds (BACs), including functional food additives. In this chapter, we have

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also discussed the future perspective and scope where liposome technology can be exploited, the different fields in which liposome nanotechnology can be a boon, and the revolution it can make in pharmaceuticals.

Keywords: liposomes, vesicles, nanotechnology, phospholipids, drug delivery system

1. Introduction

Finally, nanotechnology is fully embraced by the medication distribution industry. Intelligent drug delivery systems are continuously improved to promote therapeutic activity and minimise unrequired side effects (Safari et al., 2014). The potential of using nanoparticles as a powerful medicine delivery mechanism is enormous. Numerous investigations have been done on nanosystems with different biological properties and compositions for use in gene delivery and medicine (Suri et al., 2007).

A very important and most widely used nanotechnology used for delivering numerous drugs and achieving targeted delivery is liposomes. Liposomes are vesicles that are artificially made of one or more phospholipid bilayers containing both lipid- and water-soluble compounds. Liposomes can be optimised to fit certain medicine and targets by formulating them in a variety of sizes, bilayer melting temperatures, and surface charges. As spherical vesicles with particle sizes ranging from 30 to several micrometres, liposomes are often identifiable. Liposomes, or synthetic lipid vesicles, emerge when amphiphiles (surface-active molecules comprising a hydrophilic group and a hydrophobic group in the chain at opposing ends) are exposed to water. Amphiphiles are organised as one or more concentric bilayers (lamellae) alternating with aqueous compartments when the mass ratio of the amphiphile to water is acceptable and the temperature is also appropriate. The drugs and other solute molecules from the aqueous media are captured by liposomes as they develop. In contrast, the lipid phase may embrace lipid-soluble drugs paired with the amphiphile to form portions of the bilayers. (Gregoriadis et al., 2010).

In the pharmaceutical and cosmetic sectors, liposomes are widely employed as molecules carriers. Liposomes have gained popularity both as an experimental system and commercially due to their biodegradability, low toxicological profile, ability to bind both hydrophilic and lipophilic