

A Review of Different Types of Liposomes and Their Advancements as a Form of Gene Therapy Treatment for Breast Cancer

ABSTRACT

Breast cancer incidence and mortality rates have increased exponentially during the last decade, particularly among female patients. Current therapies, including surgery and chemotherapy, have significant negative physical and mental impacts on patients. As a safer alternative, gene therapy utilising a therapeutic gene with the potential to treat various ailments is being considered. Delivery of the gene generally utilises viral vectors. However, immunological reactions and even mortality have been recorded as side effects. As a result, non-viral vectors, such as liposomes, a system composed of lipid bilayers formed into nanoparticles, are being studied. Liposomes have demonstrated tremendous potential due to their limitless ability to combine many functions into a system with desirable characteristics and functionality. This article discusses cationic, anionic, and neutral liposomes with their stability, cytotoxicity, transfection ability, cellular uptake, and limitation as a gene carrier suitable for gene therapy specifically for cancer. Due to the more practical approach of employing electrostatic contact with the negatively charged nucleic acid and the cell membrane for absorption purposes, cationic liposomes appear to be more suited for formulation for gene delivery and therapy for breast cancer treatment. As the other alternatives have numerous complicated additional modifications, attachments need to be made to achieve a functional gene therapy system for breast cancer treatment, which were also discussed in this review. This review aimed to increase understanding and build a viable breast cancer gene therapy treatment strategy.