Advances in Immunotherapy for Cancer Treatment: Based on Liposomal Nanoparticle Delivery Systems

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Short Communication

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DESCRIPTION

Immunotherapy has become one of the most often used cancer treatments, alongside chemotherapy, targeted delivery, radiation, and surgery. The goal of cancer immunology is to employ the immune system of the body to battle tumours and build a strong antitumor immune response. Immune checkpoint inhibitors and chimeric antigen receptor-modified T cells have made significant advances in cancer immunotherapy in recent years. Nanocarriers like liposomes can increase immune responses by increasing cell type-specific delivery and immunological responses. Liposomes can help resolve a number of difficulties that can occur from a variety of cancer immunotherapies, considerably improving the efficacy of anti-tumor treatments [1].

Liposomes can be loaded with both hydrophilic and hydrophobic molecules. Liposomes offer considerable benefits over other nano delivery technologies since they may be loaded with both hydrophilic and hydrophobic medicines and protect the immunotherapeutic agents put inside the core. The utilisation of liposomes to deliver immunotherapies to specific targeted neoplasms with little or no harm to healthy cells maximises immunotherapy efficacy. Liposomes can also be used to deliver drugs alongside other therapies such as chemotherapy, radiation, and phototherapy. Liposomal nanoparticles will be developed and employed as a precise immunotherapy delivery mechanism, making them a potential cancer treatment option. This review focuses on dendritic cells, T cells, tumour and natural killer cells, and macrophages, as well as an overview of numerous types of immune-therapies in oncology and cutting-edge breakthroughs in liposomal nanovesicles for cancer immunotherapy [2].

original author and source are credited.

Cancer is defined as uncontrolled cell growth in a specific location of the body. The number of newly diagnosed malignancies rises year after year, and there are more than 100 different varieties of cancer that damage the human body Immunotherapy is sometimes seen as a relatively recent medical breakthrough, having only been developed a few decades ago. In reality, immunotherapy dates back to the 3rd century BCE reign of China's Qin dynasty.

The cancer immune hypothesis proposes that the body's immune system has the ability to eliminate malignant cells during the early stages of transformation. Traditional cancer treatments' therapeutic efficacy can be improved by the adaptive and innate immune systems. Pre-clinical trial evidence suggests that immunotherapies are crucial to the long-term efficacy of cancer therapy, establishing immunotherapy as the fourth pillar of cancer treatment. Clinically successful anticancer responses, in general, necessitate the efficient execution of several immune pathways [3].

The typical immune response to malignant cells in tumours. During tumour progression, antigens of malignancy, either Tumor-Associated (TAA) or tumor-specific antigens, are generated. Dendritic cells are antigen-presenting cells that phagocytose, process, and display cancer antigens. The major histocompatibility complex class I and class II (MHC I/II) receptor interacts with the appropriate T cell receptor, which includes the epitope peptide from tumor-associated antigens. T cells are primed in lymphoid tissue the majority of the time. Immunological positive/negative factors that prevent/promote full T cell activation via cytokines such as Transforming Growth Factor (TGF) and costimulatory receptors [4].

During priming, costimulatory receptors are susceptible to T cells. Effector T cells proliferate, release inflammatory cytokines, acquire cytolytic capabilities, and move to tumour locations after being successfully activated. Cytotoxic T cells recognise tumour cells and adhere to cancer antigens on the major histocompatibility complex I surface of cancer cells, resulting in T-cell-mediated death. T cell function in the tumour may be boosted or reduced. T lymphocytes are suppressed by negative costimulatory signals such as programmed cell death ligand 1 (PD-L1), resulting in anergy and exhaustion [5].

The combination of nanotechnology, coupled with existing anticancer immunotherapies, marks the beginning of a new era in cancer treatment. With the quantity of research on these therapeutics that is accessible and continuing, some of which are detailed above, these therapeutic agents will deliver more advanced and safer anticancer treatments. There are two types of tumour immunotherapy: humoral immunity and cellular immunity. However, immunotherapy response rates remain modest, and further research is undoubtedly required to enhance the outcomes of these treatments. Throughout the last few decades, a variety of different nanocarriers endowed with exceptional properties have been identified.

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