Evaluating nucleic acid as a potential factor in the treatment of cerebral cancer.

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Abstract

The direct, efficient, and long-lasting therapeutic effect of nucleic acid-based therapy makes it a potent tool for the treatment of malignancies. Chemo resistance and the ensuing failure of the treatment strategy are very difficult in clinical cancer therapy. The adoption of gene modulatory strategies to restore anti-cancer treatment efficacy was encouraged by the understanding of the genetic variances in chemoresistance acquisition. To mediate combination therapy between nucleic acids and anti-cancer medications, numerous intelligent nanoparticles are created and refined. Despite the fact that paediatric cancers are often less hazardous than adult malignancies, paediatric cancers nonetheless account for a sizable fraction of child fatalities, which is extremely painful for those families. Therefore, it is essential to focus more on enhancing the treatment of paediatric cancer and finding an alternative.

Keywords: Nucleic acids, Anti-cancer drugs, Neuroscience.

Introduction

Brain tumors and other central nervous system "CNS" despite on-going efforts to develop effective treatments. Tumors have been a deadly threat to human health for decades, with estimated new cases worldwide. A common treatment for brain tumors is postoperative radiation therapy combined with surgery and chemotherapy, which usually has severe side effects and a poor prognosis. Cancer immunotherapy has made great strides over the past decade and is now considered the fourth pillar of cancer treatment. The immune system includes the innate immune system and the adaptive immune system [1]. The former serve as the first line of defense against foreign substances, while the latter target specific antigens stimulated and amplified by previous exposure. The innate immune response is immediate, non-specific, and mediated by innate immune cells such as Dendritic Cells (DC), macrophages, and neutrophils. The adaptive immune response is antigen-specific and occurs over a relatively long period of time with the support of the innate immune system, which affects T and B lymphocytes and provides stimulatory signals. Cancer immunotherapy uses both systems and aims to control tumor growth, induce regression of existing tumors and develop immune memory against tumors to protect patients from recurrent disease will increase [2]. The adaptive immune system has received increasing attention due to the recent success of checkpoint blockade and adoptive T-cell transfer therapy. However, the innate immune system plays an equally important role as a direct and indirect regulator of effector cells in response to tumors. Therefore, there is growing interest in using innate immune responses to improve outcomes of cancer immunotherapy. Nucleic acid therapy is an exciting new approach to cancer therapy and a promising alternative to conventional tumor treatment regimens. Radiation, surgery, and chemotherapy are associated with severe side effects due to lack of specificity for tumor cells or decreased efficacy due to the development of chemo resistance. The concept of using nucleic acids to treat various disease states was embraced by the scientific community decades ago, but remains unclear due to ambiguity in the mechanisms that regulate target gene expression [3].

Nucleic acid delivery leading to therapeutic modulation of gene expression can be achieved using several approaches. These approaches have been previously reviewed in detail by other experts, so we only present them here. Briefly, viral delivery systems present foreign genetic material by introducing replication-defective viruses into target cells that transduce nascent DNA [4].

The sequence of the nucleic acid can be more readily modified to enable patient-specific therapy, essentially encoding any gene involved in a particular molecular signalling pathway or oncogene; so-called "drugs" can facilitate treatment of tumors. Nucleic acid therapeutics can therefore be designed to target specific genes involved in malignant glioma cell proliferation, migration, invasion, apoptosis, and angiogenesis, including gene-editing correction. Alternatively, inhibit immunosuppressive genes expressed in brain tumors, reprogram the tumor microenvironment to be proinflammatory, or induce immune responses against cancer-specific antigens as nucleic acid-based cancer vaccines. It can also be used to enable cancer immunotherapy [5].

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Conclusion

Nucleic acid-based therapies are becoming a powerful weapon in the treatment of tumors due to their direct, effective and sustained therapeutic effects. Overall survival, progression-free survival, and quality of life for cancer patients have improved over the past decade due to advances in minimally invasive surgery, precision radiotherapy, and various combination chemotherapy regimens. Additionally, the discovery of new types of treatments, such as immune checkpoint inhibitors and immune cell therapies, has made the fight against cancer easier for both patients and doctors. Furthermore, the times have been relevant for the development of biocompatible and cell type-specific Nano carriers and nucleic acid-based drugs to initiate and enhance anti-tumor responses.

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