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EDITORIAL

Approaches and challenges in cancer immunotherapy pathways

Maria Kapritsou

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Abstract

Cancer immunotherapy is an effective with critical approaches in the treatment of oncological patients. Whilst numerous research and clinical trials are underway to develop endogenous immunotherapy approaches, it is necessary to focus on fundamental issues and identify barriers to basic clinical progress. Addressing these challenges and the new pathways will require researchers and clinicians to join forces to accelerate the understanding of the complex interactions between cancer and the immune system and focus resources on developing better treatments for patients.

Key Words: Immunotherapy; Oncological patients; Immune response; Target therapies; Cancer vaccinations

Core Tip: Immunotherapy has emerged as a potent treatment for specific cancer types, which evokes enduring reactions and sometimes even induces remission. Nevertheless, the efficiency of this method relies both on the type of malignancy involved and individual patient traits. Additionally, it is administered in tandem with surgical interventions or chemotherapy/radiation regimens. It holds promise but could not act as a panacea; ongoing studies focus on enhancing its efficacy levels while comprehending underlying mechanisms more precisely.

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INTRODUCTION

Currently, among available cancer treatment methods, including traditional chemotherapy, radiation therapy, and surgery, immunotherapy is regarded as the fourth option. Over the last decade, immunotherapy has received significant attention due to its ability to enhance overall survival rates in a subset of patients considered untreatable. The recent advances made by biotechnology have led to several developments in cancer treatment and care, such as immune checkpoint inhibition (ICI), chimeric antigen receptor T cell therapy (CAR-T), and various forms of vaccination for cancer [1].

Although these methods are frequently successful, with most cases claiming defeat against specific tumor subtypes, some treatments, such as ipilimumab, a melanoma anti-CTLA4 antibody, show remarkable improvement beyond other therapies in squamous cell carcinoma of the head and neck management. Thus, although immunotherapeutics, such as anti-PD1 nivolumab, have gained aberrant FDA approval status designations, they still encounter unignorable financial challenges called impediments. Hence, facing countless issues without a complete understanding of how reversal treatment works requires experts to work even harder to design innovative, effective, evidence-based approaches. Therefore, new insights are needed. Although scientists broadly understand host-tumor interactions, they continue finding new data through well-articulated, detailed reviews and studying ICI-adoptive CAR T cell treatment and vaccines at a broad scope. Thus, they guide the prioritized simultaneous implementation of tools used in various fields, thereby providing future chances of success based on accurate, evidence-based updates[2,3].

Further research into checkpoint inhibitory pathways could aid ICI treatment and help combat tumor escape mechanisms alongside the suppressive effects of tumor microenvironment on the immune response. CAR-T yields good outcomes only in certain hematological malignancies, requiring an enhancement of its effectiveness by countering tumor-associated macrophages as an immunosuppressive component. Trials combining all these treatment modalities might be beneficial, given an improved response in terms of targeting alternative pathways through ICIs[4].

Tumor mutation burden plays an important role as a target for treatment to impair tumor immunity, inhibit tumor growth, and restore therapeutic efficacy. However, personalized differences influence drug reactions, making predictions uncertain despite notable success rates of PD-1/PDL1 or anti-CTLA4 therapy above 15%-25%, ensuring patient variability [3,4].

Biotherapy options include inducing immunologic responses that engage checkpoint inhibitors and improve targeted antibodies. Hence, adoptive cell transplants allow for controlled cancer management tactics against various malignancies without suffering radiation or chemotherapy side effects due to the accurate selection process. This development relies heavily on immuno-oncology studies fundamental to current achievements in this field, inspiring further global progress in combating cancer through biotherapy innovations, starting with novel immune-based approaches stemming from new technologies. Moreover, experimental neogenic vaccines focused primarily on pinpointing tumor mutation burden can lead to discoveries, significantly improving patient outcomes and, ultimately, accelerating research progression. Consequently, considering basic knowledge of therapeutically applied oncology, advancements in continuously updating areas aimed at better cancer control will ensure the constant development of oncology in the future[5].

Despite new approaches to boost immune cell sensitivity and activity against tumor cells, such as cancer vaccines and chemokine treatment, immunotherapy has presented major challenges. First, some oncological patients have experienced a dramatic response. Unfortunately, while scientists hope to develop an effective therapy for various patients, immunotherapy has proven successful for only a small proportion of malignancies. Furthermore, these successful cases are often the minority. Second, discovering biomarkers and cancer pathways is important for immunotherapy success. Moreover, chemotherapy and radiotherapy are performed before immunotherapy, possibly impeding the improvement in cancer immunotherapy efficacy. Therefore, cancer immunotherapy is currently not generally recommended as a first-line therapy and is typically given to patients whose immune system is already weakened due to advanced disease or previous treatment[6].

CONCLUSION

Over the last decade, cancer immunotherapy has transformed how physicians treat cancer patients. There is an impressive potential for immunotherapeutic methods in various clinical contexts—even those who previously developed resistance to treatment show promising results after such novel therapy.

FOOTNOTES

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