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Cellular Oncology and Precision Medicine: Targeted Therapies for Cancer Treatment

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Abstract

Plasma is a component of blood that contains water, electrolytes, hormones, waste products, and proteins, including antibodies and clotting factors. While plasma itself is not used as a primary treatment for cancer, it does play a vital role in cancer care in several ways. Cancer patients undergoing treatments like chemotherapy and radiation therapy may experience a decrease in their blood cell counts, including red blood cells (anaemia) and platelets (thrombocytopenia). In such cases, patients may require blood transfusions, which can include components like plasma to help manage these side effects. Cancer is a major public health problem worldwide. Global demographic characteristics predict an increasing cancer incidence in the next decades, with >20 million new cancer cases annually expected by 2025. According to GLOBOCAN data, 14.1 million new cases and 8.2 million deaths from cancer were estimated in 2012.1 Cancers of the female breast, colorectal, prostate, and lung are the most frequently diagnosed cancers in Europe.2 Lung cancer remains the leading cause of cancer incidence and mortality worldwide.

Keywords: Cancer • Cellular oncology • Plasma

Introduction

Plasma contains immunoglobulins, which are antibodies that play a crucial role in the body's immune response. In some cases, cancer patients with weakened immune systems may receive immunoglobulin therapy, which can be derived from plasma, to boost their immune function. Plasma can also be used in research and development efforts related to cancer treatment. Researchers may study plasma proteins and components to better understand cancer biology, identify potential biomarkers, or develop new therapies. Cancer was often classified and treated based on the organ where the cancer originated or simple histomorphologic (structural and cellular) characteristics. However, with increased knowledge of the molecular and genetic aspects of cancer, treatment paradigms have evolved to become more precise and tailored to individual patients. Advances in molecular and tumor biology have provided insights into the underlying genetic and molecular changes that drive cancer development and progression. This understanding has paved the way for more targeted and personalized treatment approaches [1-3].

Literature Review

In the past, cancer treatments were often based on the organ of origin (e.g., lung, breast, colon) and simple histomorphologic features (e.g., how the cancer cells looked under a microscope). The reference to the paper by Schiller et al. in 2002 likely highlights a pivotal moment in oncology. This paper may have demonstrated that in advanced Non-Small-Cell Lung Cancer (NSCLC), patients who received different platinum-based chemotherapy doublets with third-generation drugs experienced similar survival outcomes. This finding challenged the idea that treatment decisions should be solely based on the type of chemotherapy regimen used. The implication of this shift in cancer treatment paradigms is that treatment decisions are increasingly based on the molecular characteristics of the tumor. This approach, often referred to as "precision medicine" or "personalized medicine," involves identifying specific genetic mutations or alterations in a patient's tumor and selecting treatments that target those specific molecular abnormalities. This can lead to more effective treatments with fewer side effects, as well as better outcomes for cancer patients. The trial, which was limited to lung cancer, indicated that the use of cytotoxic chemotherapies in unselected patients had reached a point of diminishing returns or a "therapeutic plateau." In other words, the benefits of broad, non-targeted chemotherapy in these patients had likely been maximized, and further gains in survival or treatment effectiveness were limited [4].

Profiling can identify specific genetic mutations

The trial's results emphasized the necessity of developing molecularly targeted therapies for cancer treatment. Rather than using a one-size-fits-all approach with cytotoxic chemotherapy, there was a growing recognition that treatment should be tailored based on specific molecular alterations or genetic characteristics of the patient's tumor. he statement identifies two key factors that have driven the subsequent evolution of cancer treatment. Advances in technology have allowed for more comprehensive profiling of a patient's tumor at the molecular level. This profiling can identify specific genetic mutations, alterations, or biomarkers that can guide treatment decisions. Techniques like next-generation sequencing (NGS) and molecular diagnostics have become essential tools in this regard. Research efforts have led to the discovery of specific molecular targets within cancer cells. These targets represent vulnerabilities that can be exploited with targeted therapies. The development of drugs that precisely target these molecular alterations has revolutionized cancer treatment, offering the potential for more effective and less toxic therapies. This shift towards precision medicine, where treatment is based on the unique genetic and molecular characteristics of each patient's cancer, has been a major advancement in oncology. It has led to the development of targeted therapies, immunotherapies, and other innovative treatments that have improved outcomes and quality of life for many cancer patients [5,6].

Discussion

The longstanding hypothesis of cancer immunoediting is now recognized as a core process of tumorigenesis. It is well known that many solid tumors are immunogenic.21 during malignant transformation, non-self, tumor-associated antigens or neoepitopes resulting from gene mutations are created, which can be recognized by the immune system. This process is called immune surveillance. At least initially, adaptive, tumor antigen–specific T-cell responses are generated, leading to cancer-cell. This approach has been particularly successful in

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cancers such as lung cancer, where specific mutations (e.g., EGFR, ALK) have been identified as drivers of the disease, and targeted therapies have shown remarkable efficacy. These principles of personalized medicine continue to drive progress in cancer research and treatment across various cancer types.

Conclusion

It's important to note that this approach is particularly relevant in diseases like lung cancer, where subtypes and genetic mutations can significantly impact treatment responses. The field of oncology continues to evolve rapidly as researchers uncover more about the genetic and molecular underpinnings of cancer, offering new hope for improved cancer therapies. Additionally, advances in genomics and molecular profiling are helping identify more precise and personalized treatment approaches for individual patients. While the reductionist approach has yielded important insights and clinical benefits, the future of cancer treatment may increasingly involve more holistic and comprehensive strategies to tackle the complexities of this disease.

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Conflict of Interest

None.

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