Advancements in targeted therapies for skin cancer: A clinical dermatology perspective.

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Introduction

Skin cancer is a prevalent and potentially deadly condition that continues to pose a significant public health concern. Over the years, advancements in medical science have led to ground breaking developments in the treatment of skin cancer, with targeted therapies emerging as a promising frontier in clinical dermatology. These therapies offer a more precise and effective approach to managing skin cancer, addressing specific molecular targets implicated in the disease process.

Targeted therapies represent a paradigm shift in the treatment of skin cancer compared to traditional modalities such as surgery, chemotherapy, and radiation therapy. Rather than indiscriminately attacking rapidly dividing cells, targeted therapies focus on specific molecules or pathways crucial for cancer cell survival and proliferation. One notable class of targeted therapies for skin cancer includes Epidermal Growth Factor Receptor (EGFR) inhibitors. EGFR is a protein that plays a crucial role in cell growth and division. Aberrant activation of EGFR is common in various cancers, including certain types of skin cancer. Drugs like cetuximab and erlotinib target and inhibit EGFR, disrupting the signalling pathways that drive cancer cell growth.

Description

Another significant advancement in targeted therapy focuses on the Mitogen-Activated Protein Kinase (MAPK) pathway, which is frequently dysregulated in skin cancer. Mutations in the BRAF gene are common in melanoma, a type of skin cancer. BRAF inhibitors like vemurafenib and dabrafenib specifically target the mutated BRAF protein, inhibiting the downstream signaling cascade. Additionally, MEK inhibitors such as trametinib complement BRAF inhibitors by blocking another key molecule in the MAPK pathway, enhancing the therapeutic effect.

Targeted therapies have also extended to immunotherapy, revolutionizing the landscape of skin cancer treatment. Immune checkpoint inhibitors like pembrolizumab and nivolumab unleash the body's immune system to recognize and attack cancer cells. By blocking inhibitory pathways that suppress immune responses, these drugs enhance the immune system's ability to identify and eliminate cancer cells, offering durable responses in some patients.

Recent research has highlighted the potential benefits of combining targeted therapies to improve treatment outcomes. Combinatorial approaches, such as using BRAF and MEK inhibitors together, have demonstrated increased efficacy and delayed resistance in patients with BRAF-mutant melanoma. Similarly, combining targeted therapies with immunotherapy has shown promise in enhancing anti-tumor immune responses and overcoming resistance mechanisms.

The advent of targeted therapies has paved the way for personalized medicine in the field of dermatology. Molecular profiling of tumors allows clinicians to identify specific genetic alterations driving cancer growth. This information guides the selection of targeted therapies tailored to the individual's unique molecular profile, maximizing treatment efficacy while minimizing side effects. While targeted therapies represent a significant advancement in skin cancer treatment, challenges persist. Resistance to targeted therapies can develop over time, necessitating ongoing research to understand the underlying mechanisms and develop strategies to overcome resistance. Additionally, managing the potential side effects of these therapies remains a critical aspect of patient care.

Conclusion

The landscape of skin cancer treatment is undergoing a transformative shift with the advent of targeted therapies. These advancements, rooted in a deeper understanding of the molecular mechanisms driving cancer progression, offer a more precise and personalized approach to patient care. As research continues to unravel the complexities of skin cancer biology, the integration of targeted therapies into clinical dermatology practices holds the promise of improved outcomes and a brighter future for individuals battling this formidable disease.

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