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ROLE OF SYSTEMIC MEDICATIONS IN ORAL CANCER PROGRESSION-A REVIEW

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Abstract
Oral cancer encompasses malignancies within the oral cavity, including the lips, tongue, and other surrounding tissues. Systemic medications play crucial roles throughout the stages of oral cancer progression, ranging from prevention to palliative care. This review explores the various systemic treatment modalities, their mechanisms of action, and future perspectives on drug delivery systems designed for oral cancer management.

Keywords: Oral Cancer, Systemic Medications, Chemoprevention, Adjuvant Therapy, Neoadjuvant Therapy, Targeted Therapies, Immunotherapy, Chemotherapy, Palliative Care, Drug Delivery Systems, Polymeric Nanoparticles, Nanolipids, Inorganic Nanoparticles, Hydrogels,Personalized Medicine, Head and Neck Squamous Cell Carcinoma (HNSCC)

INTRODUCTION

Oral cancer represents a significant health concern globally, affecting various anatomical sites within the oral cavity. The systemic medications used in its treatment can be classified based on their roles at different stages of cancer development. These roles include chemoprevention, adjuvant therapy, neoadjuvant therapy, targeted therapies, immunotherapy, chemotherapy, and palliative care.

Chemoprevention

Certain systemic medications, particularly retinoids such as isotretinoin, are under investigation for their potential to inhibit the progression of precancerous lesions to invasive cancer. This preventive approach is particularly crucial for individuals at elevated risk of developing oral cancer.

Adjuvant Therapy

Post-surgical management often employs systemic medications to eliminate any residual cancer cells. Adjuvant therapies may include chemotherapy, targeted therapies, and immunotherapy, all aimed at reducing the likelihood of recurrence and improving overall survival rates.

Neoadjuvant Therapy

Neoadjuvant therapy involves the administration of systemic medications prior to surgical intervention. This approach aims to shrink tumors, enhancing the feasibility of surgical resection and improving outcomes from subsequent treatments.

Targeted Therapies

Targeted therapies focus on specific molecular pathways involved in cancer progression. For instance, epidermal growth factor receptor (EGFR) inhibitors can effectively disrupt the signaling pathways that promote tumor growth, thus slowing disease progression.

Immunotherapy

Immune checkpoint inhibitors represent a promising avenue in the treatment of advanced oral cancers. These agents enhance the body's immune response against cancer cells by blocking proteins that impede immune activation.

Chemotherapy

Traditional chemotherapy employs drugs that target rapidly dividing cells, including cancer cells. Administered either orally or intravenously, chemotherapy circulates throughout the body, impacting cancerous cells at multiple sites.

Palliative Care

In advanced cases where cure is not achievable, systemic medications are essential for symptom management, pain control, and enhancing the quality of life for patients.

The selection of systemic medications is tailored to the specific characteristics of the cancer, including its stage, the patient's health, and relevant molecular markers. A multidisciplinary team approach is essential for optimizing treatment plans.

Drug Delivery Systems for Oral Cancer

Recent advancements in drug delivery systems (DDS) aim to enhance the efficacy of systemic medications while minimizing side effects. Various carriers for drug delivery have been explored:

- **Polymeric Nanoparticles**: Biodegradable and biocompatible, these nanoparticles offer controlled and sustained release of drugs but may exhibit cytotoxicity after internalization.
- **Nanolipids**: Highly stable and suitable for delivering poorly soluble drugs, nanolipids can penetrate deeply into tumors, though they may have limitations regarding initial burst release
- and potential immune responses.
- **Inorganic Nanoparticles**: These allow for targeted delivery via ligand attachment. However, they can pose toxicity risks and have limited capabilities in delivering biomacromolecules.
- **Hydrogels**: These systems are injectable and maintain their structural integrity while offering high drug loading capacities. Challenges include poor mechanical properties and high production costs.

CONCLUSIONS AND FUTURE PERSPECTIVES

One of the significant challenges in managing head and neck squamous cell carcinoma (HNSCC) is overcoming cancer cell resistance to conventional therapies. Innovative drug delivery systems are showing promise in addressing these limitations by enhancing the precision of treatment. Future efforts should focus on personalized drug delivery systems that consider the unique genetic, molecular, and histological characteristics of each tumor.

Although significant progress has been made, most advancements remain in experimental phases, with few formulations reaching clinical application. Continued research is essential to develop novel drug delivery methods that address the unmet needs of oral cancer treatment, ultimately aiming for personalized, effective therapies tailored to individual patient profiles.

REFERENCES

1. Vogel D.W.T., Zbaeren P., Thoeny H.C. Cancer of the oral cavity and oropharynx. Cancer Imaging. 2010;10:62.
2. Manikandan M., et al. Oral squamous cell carcinoma: microRNA expression profiling and integrative analyses for elucidation of tumourigenesis mechanism. Mol. Cancer. 2016;15:28.
3. Rivera C. Essentials of oral cancer. Int. J. Clin. Exp. Pathol. 2015;8:11884.
4. Bray F., et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide. CA. Cancer J. Clin. 2018;68:394–424.
5. Oral Cavity Cancer Statistics-Canadian Cancer Society.
6. Denise M., et al. Oral Cancer: Just the Facts-Canadian Dental Association.
7. Marur S., Forastiere A.A. Head and neck cancer: Changing epidemiology, diagnosis, and treatment. Mayo Clin. Proc. 2008;83:489–501.
8. Nör J.E., Gutkind J.S. Head and neck cancer in the new era of precision medicine. J. Dent. Res. 2018;97:601–602.
9. Prince V.M., et al. Oral Cancer and Cancer Stem Cells: Relevance to Oral Cancer Risk Factors, Premalignant Lesions, and Treatment. Curr. Oral Heal. Rep. 2016;3:65–73.