Preface: Oral Cancer: New Insights in Diagnosis, Prognosis, Therapeutics to Management and Reconstruction

Oral cancer is a major health concern in developing nations such as India, which accounts for one-third of the worldwide oral cancer burden. This issue offers fresh perspectives for the early identification and treatment of OSCC. Early identification of oral cancer when the tumor is still small provides a favorable prognosis and less morbidity after treatment. Thankfully, a percentage of oral cancers are preceded by premalignant alterations, and if such changes are discovered before the development of a tumor, it is possible to intervene and lower the risk of cancer.

The issue begins with a review on ovarian cancer. In Dholariya et al.’s article, “CRISPR/Cas9: A Molecular Tool for Ovarian Cancer Management Beyond Gene Editing,” the authors analyze the current research and progress made using CRISPR/Cas9-based engineering strategies in the diagnosis and treatment of ovarian cancer cells. This gene-editing system has evidence to prove its capabilities in the diagnosis and treatment of ovarian cancer.

The issue continues with recent advances in the therapeutic modalities used to treat oral cancer. In addition to conventional therapeutic methods, immunotherapy is being employed as a revolutionary method to combat the disease. The article by Dutta et al., “Immunotherapy and Targeted Therapy in the Management of Oral Cancers,” discusses the immune context of oral cancer cells, the process of immune evasion by cancer cells, immunotherapeutic targets, existing immunotherapeutic drugs, and immunotherapy’s prospects. Currently available targeted immunotherapies include epidermal growth factor receptor (EGFR)–targeting monoclonal antibodies such as cetuximab and panitumumab; programmed cell death-1 (PD-1) inhibitors such as pembrolizumab, cemiplimab, and nivolumab; and programmed cell death ligand 1 (PD-L1) inhibitors such as atezolizumab, avelumab, and durvalumab. Targeted immunotherapies such as chimeric antigen receptor T-cell treatment and small-molecule inhibitors have been evaluated as monotherapy and adjuvant immunotherapy in some clinical trials, with encouraging results. Various immunotherapeutic strategies, such as cytokines such as interferons or interleukins, vaccinations, and gene therapy, have also been investigated for the treatment of oral cancer. Nonetheless, the careful selection of patients with specific immunological features as candidates for immunotherapeutic drugs is a fundamental aspect of tailored immunotherapy.

Goel et al., in their article, “Diagnostic Adjuncts in Oral Cancer Evaluation,” explore the current diagnostic tools for oral cancer and the potential future applications of cutting-edge, innovative technologies such as artificial intelligence and imaging to diagnose the disease. The article provides a comprehensive overview of adjunct devices that have been created and are commercially available to aid in the chairside detection of lesions suspected of being oral cancer or potentially malignant illnesses. The authors have not only addressed the significance and limitations of each of the newer diagnostic adjuncts, but have also reviewed the technological advances, new diagnostic augmentations, CRISPR, and prognostic markers that will play a greater role in the future. Such technological advances that help in screening have immense significance in developing countries such as India, which are resource limited, especially in remote areas. Common diagnostic adjuncts discussed are clinical methods such as toluidine blue, brush biopsy with cytology, visualization adjuncts such as autofluorescence imaging, salivary-based diagnostics, and future aids such as artificial intelligence.

Understanding the tumor microenvironment (TME) and immune evasion tactics of tumor cells have significantly aided the synthesis of novel compounds targeting the immune system and accelerating the death of tumor cells. Recent studies on the
mechanisms driving TME in oral cancer have suggested that epigenetic events may play a part in this complex network. These epigenetic mechanisms also control tumor initiation, progression, and metastasis. Therefore, it is necessary to develop and combine tumor epigenetic profiles with clinicopathological and radiological information. Dholariya et al., in their article, “Role of the Tumor Microenvironment and the Influence of Epigenetics on the Tumor Microenvironment in Oral Carcinogenesis: Potential Implications,” thoroughly investigated the role of TME in the formation and progression of oral cancer. They also summarize our current knowledge of the epigenetic changes that control the TME, their combined effects on tumor characteristics, and their potential as therapeutic targets.

Conventional therapies also usually encounter regimen resistance, and recurrence is often linked to cancer stem cells (CSCs). The review by Joshi et al., “Eliminating Cancer Stem-Like Cells in Oral Cancer by Targeting Elementary Signaling Pathways,” characterizes CSCs and includes discussions of potential targeted therapeutics for eliminating CSCs in oral malignancies. The review discusses a variety of cell surface markers, including CD44, ALDH1, EpCAM, CD24, CD133, CD271, CD90, and Cripto-1, that can be used to recognize and separate CSCs from primary OSCC. The authors also address the functional and molecular underpinnings of many embryonic signaling pathways, including Wnt/catenin, Notch, Hedgehog, and Hippo signaling, and their relationship to the aggressiveness of illness. The authors emphasize that more research is still needed to learn about the complex extracellular microenvironmental factors that contribute to therapy resistance and relapse in oral cancer, including exosomes, immune cells, hypoxia, and angiogenic factors, in order to create more effective, individualized treatments for cancer patients. This is true even though the major signaling pathways and their targets for eliminating CSCs from their niche have been identified.

Overall, this special issue provides insights into diagnostic adjuncts used to evaluate oral cancer at an early stage. The role of the TME and epigenetics in tumor progression has also been explored, as well as their use as therapeutic targets and newer treatment modalities.

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