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Oral Cancer Detection Using Salivary Biomarkers: An Investigative Systematic Review

Evander Runehart*

Department of Oral Cancer, Australian National University, Canberra ACT 0200, Australia

Introduction

Oral cancer, specifically Oral Squamous Cell Carcinoma (OSCC), is a significant global health concern with high morbidity and mortality rates. According to the World Health Organization, approximately 377,000 new cases of oral cancer are diagnosed yearly worldwide, with the highest prevalence in Southeast Asia, Central Europe, and certain parts of North America. Despite advancements in medical imaging and diagnostics, early detection remains challenging due to a lack of non-invasive and cost-effective methods. Traditional diagnostic methods rely on visual and physical examination, biopsy, and histopathological analysis. However, these methods are invasive, costly, and often lead to delays in diagnosis, particularly in regions with limited healthcare resources [1].

In recent years, the potential of salivary biomarkers for early cancer detection has been extensively explored. Saliva is a non-invasive biofluid, easily collected, and rich in molecules reflecting systemic physiological and pathological states. Various biomarkers in saliva, including DNA, RNA, proteins, metabolites, and microbiota, have shown promise in diagnosing oral cancer. This systematic review investigates the potential of salivary biomarkers as a diagnostic tool for oral cancer, analyzing the latest evidence on their accuracy, sensitivity, and reliability. This article aims to provide an in-depth analysis of salivary biomarkers, their diagnostic efficacy, and the clinical applicability of saliva-based diagnostic techniques in oral cancer detection [2].

Description

Oral cancer ranks as the sixth most common cancer globally, with risk factors including tobacco use, alcohol consumption, poor oral hygiene, Human Papillomavirus (HPV) infection, and genetic predispositions. A majority of cases are detected at advanced stages due to a lack of effective screening protocols, contributing to a poor prognosis and lower survival rates. In addition to the direct physical implications, oral cancer has a profound impact on patients' quality of life, affecting speech, eating, and social interactions. Traditional diagnostic procedures have limitations in accessibility and invasiveness, necessitating alternative diagnostic modalities that can reach a wider population. Saliva, often referred to as the "mirror of the body," has gained attention as a diagnostic medium due to its accessibility and non-invasive collection methods. Saliva contains a wide range of biological molecules, including DNA, RNA, proteins, and metabolites, which can reflect both oral and systemic health conditions [3].

Genetic mutations and epigenetic modifications are key indicators of malignancy. DNA mutations in genes like TP53, Cyclin D1, and EGFR have been linked to oral cancer. Epigenetic alterations, such as DNA methylation in promoter regions of tumor-suppressor genes, are also detectable in saliva. These changes are indicative of malignant transformation and can be used to differentiate between benign and malignant lesions. DNA methylation markers like p16 and MGMT have been studied extensively for their potential in oral cancer diagnosis. Various RNA molecules, including messenger RNA (mRNA), microRNA (miRNA), and long non-coding RNA (lncRNA), have been identified as biomarkers for oral cancer. miRNAs, in particular, play a critical role in cancer progression by regulating gene expression. Specific miRNAs, such as miR-31, miR-21, and miR-200a, are overexpressed in oral cancer patients. The differential expression of miRNAs in saliva compared to healthy individuals provides a non-invasive means of cancer detection with high accuracy [4].

Proteins in saliva, such as cytokines, enzymes, and growth factors, can reflect the physiological state of the oral cavity. Elevated levels of proteins like IL-6, IL-8, and Tumor Necrosis Factor-alpha (TNF-⊠) have been associated with oral cancer. These inflammatory markers are indicative of the inflammatory microenvironment that supports tumor development. Proteomic analysis has also identified specific salivary proteins, including Lactate Dehydrogenase (LDH) and Matrix Metalloproteinases (MMPs), as potential biomarkers for distinguishing between malignant and benign lesions. Metabolomics is the study of small molecules, or metabolites, within biological samples. In the context of oral cancer, metabolites in saliva such as polyamines, amino acids, and lipids have been found to vary significantly between healthy individuals and cancer patients. Metabolic profiling of saliva using techniques like Nuclear Magnetic Resonance (NMR) and Mass Spectrometry (MS) has revealed that alterations in these metabolites correlate with tumor development and progression [5].

Conclusion

The application of salivary biomarkers for oral cancer detection represents a promising advancement in non-invasive diagnostics. Salivary biomarkers, encompassing genetic, epigenetic, protein, metabolomic, and microbial indicators, offer a comprehensive view of the physiological and pathological state of the oral cavity. The potential of saliva as a diagnostic tool lies in its accessibility, ease of collection, and ability to reflect systemic conditions. While current evidence supports the diagnostic accuracy of salivary biomarkers, significant challenges remain in standardizing methodologies and validating findings across diverse populations. Future research should focus on developing standardized protocols, exploring novel biomarkers, and leveraging technology to enhance diagnostic accuracy. The integration of salivary diagnostics with machine learning and portable devices holds promise for revolutionizing oral cancer screening programs, especially in underserved regions. With continued advancements, saliva-based diagnostics have the potential to become a valuable tool in the early detection and management of oral cancer, ultimately improving patient outcomes and reducing the global burden of this disease.

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Conflict of Interest

None.

***Address for Correspondence:** *Evander Runehart, Department of Oral Cancer, Australian National University, Canberra ACT 0200, Australia; E-mail: evanderru@yahoo.com*

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References

1. Awasthi, Nidhi. "Role of salivary biomarkers in early detection of oral squamous cell carcinoma." *Ind J Pathol Microbiol* 60 (2017): 464-468.
2. Li, Shu-Xia, Yan-Qi Yang, Li-Jian Jin and Zhi-Gang Cai, et al. "Detection of survivin, carcinoembryonic antigen and ErbB2 level in oral squamous cell carcinoma patients." *Cancer Biomarker* 17 (2016): 377-382.
3. Duz, Mehmet Bugrahan, Omer Faruk Karatas, Esra Guzel and Nesrettin Fatih Turgut, et al. "Identification of miR-139-5p as a saliva biomarker for tongue squamous cell carcinoma: A pilot study." *Cell Oncol* 39 (2016): 187-193.
4. St. John, Maie A. "Inflammatory mediators drive metastasis and drug resistance in head and neck squamous cell carcinoma." *Laryngoscope* 125 (2015): S1-S11.
5. Ancrile, Brooke, Kian-Huat Lim and Christopher M. Counter. "Oncogenic Ras-induced secretion of IL6 is required for tumorigenesis." *Gene Develop* 21 (2007): 1714-1719.

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