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BIOMARKERS IN ORAL CANCER-A REVIEW

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ABSTRACT The incidence and mortality rate of oral cancer have increased throught out the world. Early detection through different investigatory methods and newer screening approaches are very important to reduce the mortality of this disease. Sensitive and specific Biomarkers for oral cancer are not only used for effective screening but also the use extends in diagnosing, and even for staging. . Advancement in technology in genomics, proteomics and molecular pathology have increased the clinical value of biomarkers. Clinical significance of biomarkers can be used to combat oral cancer. Hence, we have reviewed the importance of biomarkers for oral cancer.

KEYWORDS : Oral cancer, Biomarkers,Screening,Staging, Public health.

INTRODUCTION

Oral cancer (OC) a malignant tumor of the oral cavity. The sixth most common type of cancer affecting world wide is cancer occurring in the oral cavity and pharynx.[1,2] Changes of genetic and epigenetic causes imbalance in the homeostatic equilibrium between cell proliferation and cell death which leds to cancer. In carcinogenesis the molecular changes are: (i) cancer cell proliferation without external stimuli, (ii) insensitivity to inhibitory growth signals, (iii) evasion of apoptosis or cell death mechanisms and/or activation of anti-apoptotic genes, (iv) unlimited replicative potential, (v) sustained angiogenesis, (vi) invasion and metastasis ability, (vii) genomic instability, and (viii) protooncogenes mutation caused by defects in DNA repair[3]. Though OC occurs in areas that can be adequately visualized the accurate diagnosis of subtle symptoms of early OC and inflammatory lesions is still difficult[4] , leading to diagnosis of OC in advanced stages[5,6] with low prognosis, despite advances in treatment, which have resulted in an overall 5-year survival rate of approximately 50%[1,7,8]. Few biomarkers are tested clinically for detection of oral cancer and open biopsy is presently the only assured criteria to confirm a diagnosis of cancer. Although open biopsy is effective to diagnose OC, this method provides definitive drawbacks, such as invasiveness[9]. Molecular biomarkers are ideal for objective screening and diagnosis, enabling the early detection of OC[10,11]. Compared with biomarkers in blood[12],salivary biomarkers have obvious advantages; sampling is non-invasive, convenient and safe, thus facilitating frequent screening for oral cancers.

Biomarker Categories :

The underlying tissue changes in the disease process could be categorized as genomic, proteomic, or metabolomic expressions[3]. Biomarkers include nucleic acids, proteins, peptides, enzymatic changes, antibodies, metabolites, lipids, and carbohydrates[13].Biomarkers can be derived from one, or a combination, of the following body fluids blood, serum, plasma, body secretions (sputum, saliva), or excretions (stool, urine). Body fluids sample for biomarker investigation can be obtained by noninvasive, minimally invasive or invasive methods[14].

Uses :

Assessment of patients using biomarkers can be carried out in different clinical settings. It is used for estimating the risk of the disease, it is used for screening primary cancers, to differentiate between benign and malignant ,and also different types of malignant tumors. The prognosis of the disesase is determined hence the bio markers are used for screening as well as to monitor the status of the disease. Biomarkers can be used during treatment to evaluate the recurrence of the disease and progression during the treatment.The risk reduction strategies or screening have been effective and when these strategies applied to high-risk groups are much more efficient than wholesale application to the entire population.[15]

Salivary biomarkers such as L-phenylalanine serve as screening biomarkers and help in the early diagnosis and monitoring of oral squamous cell carcinoma (OSCC)[16]. Cloning of an acidic laccase gene 2 is a proteomic biomarker that is used to differentiate between squamous cell carcinoma and adenocarcinoma[17]. The angiogenetic marker cluster of differentiation factor 34 (CD34) serves as an important predicting tool for recurrent cases of OSCC[18]. Genomic biomarkers such as integrin 3 and integrin 4 have been positively correlated with distant metastases and prognosis of tumors[19].Sixty vascular endothelial growth factor, B-cell lymphoma-2, claudin 4, yes-associated protein 1 and MET proto-oncogene, and receptor tyrosine kinase were suggested as a novel group of biomarkers that function as therapeutic monitors and radioresistance predictors in OSCC patients[20].

Immunoassay validation of salivary proteins such as Mac-2-binding protein (M2BP), profilin, CD59, MRP14, catalase, histone H1, S100A12, rat sarcoma viral oncogene homolog (Ras)-related protein Rab-7, moesin, involucrin, S100 calcium binding protein P (S100P), and hematopoietic lineage cell-specific protein are differentially abundant in OSCC and healthy control subjects according to Hu et al.[21] Aberrant expression of miR-375, miR-200a, and miR-200c-144 methylation was initially identified in OSCC and suggested as a potential clinical application for OSCC diagnosis[22].

CONCLUSION:

The use of biomarkers are not only considered for cancer screening or assessment of risk but might also be proven useful for staging of cancer . The ideal biomarker when used for staging it should be sensitive, specific, fast and cost-effective.The clinical value must demonstrate beyond that of the other types of information that are already available at the time of diagnosis.More studies to be conducted for the use of biomarkers in future.

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