The Study and Characterization of Primary Squamous Cell Carcinoma of the Head and Neck and Their Malignant Potential

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Introduction

Squamous cell carcinomas (HNSCC) form 90% of all head and neck cancers. Even with advanced therapy and operative skills, the 5-year survival rate is no more than 50%[1]. HNSCC are not only caused by tobacco and alcohol abuse, there is also a huge involvement of HPV infections[2]. New potentially clinically useful biomarkers are being studied, such as metallothioneins (MT)[3] or miRNAs[4].

Materials/methods

Samples from almost 300 HNSCC positive and healthy patients were tested – biopsy of tumour tissue, adjacent healthy tissue or leucocytes were used in this study and compared with non-cancer individuals. Standard PCR or qRT-PCR methods were employed to detect HPV or expression of certain genes.

Results and conclusion

54% of studied HNSCC patients were HPV-positive, with 21% of HPV 16 subtype, 13% of HPV 18 subtype and 7% of HPV 16 and 18 types co-infection. The expression of commonly studied HNSCC markers *MT2*, *MMP9, FLT1*, *VGFA* and *POU5F* was significantly inhibited in HPV-positive HNSCC patients, compared with HPV-negative patients. The HPV-positive patients also showed better disease-specific survival. Moreover, expression of other genes was also studied. *MT2A*, *BAX*, *EGF* and *JUN* showed increased expression in the healthy tissues surrounding the tumour tissue and a significant shift of *BAX*/*BCL2* ratio was observed. The adjacent healthy tissue was also shown to release several tumour-supporting factors, increasing cancerogenesis. Also, an increase in the expression of the protein metallothionein was observed, in tumour-adjacent tissue and more so in the tumours, evidencing it as a potential HNSCC biomarker. Based on this information, microfluidic label-free bead-based, portable metallothionein immunosensor with electrochemical detection was designed with LOD of 12.5 ng/mL.

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