REVIEW ARTICLE

THE ROLE OF HUMAN PAPILLOMAVIRUS IN HEAD & NECK SQUAMOUS CELL CARCINOMA

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ABSTRACT

Human papillomavirus (HPV) belongs to the family Papillomaviridae. More than 100 serotypes have been identified. While in more than 90 percent cases HPV 16 is mostly responsible for head and neck cancer (HNC). HPV affects several sites like salivary glands, oral cavity, nose, paranasal sinuses, oro-pharynx, hypo-pharynx, lips, naso-pharynx, oesophagus, larynx and the soft tissues of ear and neck. Worldwide yearly over 650,000 patients are diagnosed with head and neck squamous cell carcinoma (HNSCC). It is the sixth most common cancer in the world. Presently two vaccines are available for HPV, which are thought to have a role in the prevention of infections and tumors.

KEY WORDS: Human papillomavirus 16; Papillomaviridae; Cancer; Squamous cell carcinoma; Cervarix.

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INTRODUCTION

Human papillomavirus (HPV) virus belongs to the family Papillomaviridae. More than 100 serotypes are found on the mucous membrane of genitals, oral cavity, skin warts, nasal openings oro-pharynx and hypopharynx. Fifteen out of these serotypes play an oncogenic role.[1] More than 90 percent of head & neck cancer (HNC) is caused by HPV16.[2] Depending upon the seriousness, there are three groups of serotypes; low, intermediate and high risk. HPV type 6 and 11 belong to low risk while type 16, 18, 31, 33, and 45 are high risk group members. The genome of HPV consists of double stranded DNA with 8000 nucleotides. The genome is enclosed in 52-55 nm capsid and codes for the virus capsid proteins (L1 and L2) and several other proteins that are involved in various processes. The cell cycle control is deregulated by E6 and E7 because E6 binds and degrades p53 and the other leads to the inhibition of function of Retinoblastoma protein. The protein known as L1 has the ability to assemble into a virus like particle that leads to formation of vaccination against the infection of HPV.[3] The infection of HPV is transmitted sexually.[1]

Some of the malignancies of upper respiratory tract and upper digestive tract are included in HNC.[4] Lesions are formed on several sites including lips, oral cavity, nose paranasal sinuses, oesophagus, salivary glands, larynx and the soft tissues of ear and neck. The most widespread histological form of HNC is squamous cell carcinoma (HNSCC) that occurs in pharynx, larynx and oral cavity.[5] The percentage of this cancer varies in the population of tumors due to tobacco associated diseases. Poor oral hygiene, tobacco, genetics and alcohol are considered the various risk factors but HPV is the primary cause of these cancers.[2]

DISCUSSION

Worldwide yearly over 650,000 patients are diagnosed with HNSCC.[6,7] It is the sixth most common cancer in the world with an incidence and death rates of 563826 and 301408 respectively.[2] South and Southeast Asia alone accounts for 58 percent of the total of this cancer.[8] The occurrence of HNSCC varies worldwide; in India it is the most common cancer, and the prevalence is greater in Latin America than in northern Europe and US.[9] It accounts for 3 to 4 percent of all the diagnosed cancers in North America and EU. While HNC accounts for approximately 8 to 10 percent of all cancers in Africa and Southeast Asia.[10] The incidence and mortality due to cancer vary in Southeast Asia and Eastern Europe.[11] Globally the prevalence of disease changes significantly due to culture and socioeconomics differences.[5] It is seen

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that men are more affected as compared to women because of more alcohol consumption, betal chewing and smoking are the main factors for this cancer.[9]

HPV causes the cancer mostly in palatine tonsils and lingual.[12] HPV targets the epithelium but, the properties of epithelium due to which it is susceptible to virus are not recognized.[13] The virus incorporates the genome in the host cell nucleus and disregulates the appearance of oncoproteins E6 and E7.[14] Oncoprotein E6 causes the degradation of p53, causing the loss of p53 activity. Normally p53 induces apoptosis, while the E6 upsets this function of p53. The oncoprotein E7 inactivates the pRB leading the cell to S phase causing proliferation, malignant transformation and cell-cycle disruption.[14]

The detection of HPV in mucous membrane is mostly done by PCR that is highly sensitive.[15] While the histopathological detection of Human papillomavirus from samples of tumor tissue is also performed. By using the signal amplification system, the significance of in situ hybridization has been pointed. This method is a less costly method and allows the visualization of infected cells.[16-18] HPV16 is the major cause of HNC.[19] However, the occurrence of the virus alone in swabs is not an indicator of a HPV+ tumor.[20] While during the molecular detection of Human papillomavirus genome, it is compulsory that the analytic trial which are in use are highly specific, and sensitive, and it must be kept in mind that several variables affects the efficiency of HPV detection. By in situ oncogenic protein staining techniques and in situ hybridization, the sensitivity and specificity of Head and neck analytic practices have been increased. These techniques not only identify or detect the level of HPV but also describe the level of infection. In situ hybridization (ISH) and Immunohistochemistry (IHC) are considered less sensitive. For HPV, a highly sensitive and universal uncovering of HPV should be performed. Today PCR as compared to classical immunohistochemical techniques is able to identify HPV.[21] The highly sensitive SPF10 HPV DNA test can be conducted as a quality screening test for virus recognition.[22]

At this time two commercially available vaccines, bivalent (HPV16/18) vaccine Cervarix (GSK), and the quadrivalent (HPV6/11/16/18) Gardaril (Merck) are used against HPV. These are licensed globally, and expected to prevent tumors and infections caused by HPV.[7]

CONCLUSION

HPV causes head and neck cancer by targeting the epithelial tissue at the target site. The virus integrates the genetic material in the host cell and deregulates the functions of host cells leading to cancer. Presently two vaccines are available for HPV. These are thought to have a role in the prevention of tumors and infection.

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CONFLICT OF INTEREST
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