

## The human papilloma virus and its capacity to cause various cancers.

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### Abstract

**A brief analysis and assessment has been done in acquiring information and knowledge regarding the human papilloma virus and its capacity to cause various cancers. The understanding of HPV and its capacity to cause various cancers has been acknowledged. This article includes HPV family and clinical significance, pathogenesis and mode of action, mode of infection, molecular diagnosis, and biological activity of oncoproteins, capacity of HPV in cancer development, and finally HPV vaccination and prevention. The article mainly focused on the main mechanism of action of HPV in causing cancer in the host.**

**Keywords:** HPV; Squamous intraepithelial cells; Molecular onco-proteins; Neoplasia; Centrosomes

*Accepted on July 20, 2020*

### What is Human Papilloma Virus?

Human Papilloma Virus (HPV) is a group of viruses that are extremely common worldwide. There are more than 100 types of HPV, of which at least 13 are cancer-causing (also known as high risk type). Papilloma viruses are small, non-enveloped, epitheliotropic, double-stranded DNA viruses that infect mucosal and cutaneous epithelia in a wide variety of higher vertebrates in a species-specific manner and induce cellular proliferation. HPV is mainly transmitted through sexual contact and most people are infected with HPV shortly after the onset of sexual activity [1].

### Pathogenesis and mechanism of infection

The virus initially attacks the squamous epithelial cells that have the ability to proliferate, and get access to basal cell at the time of trauma. In the basal cells, HPV infection induces the expression of viral genes that favors the replication of virus. The interaction of HPV with the host cells occurs with the help of surface receptors such as heparin sulfate proteoglycans and alpha 6 integrins. The early proteins E1 and E2 are needed for the initiation of replication. The protein E2, which is the transcriptional repressor of E6 and E7, controls the expression of E6 and E7. The way of replication is the rolling circle mechanism during which the virus gets incorporated into the human genome. This incorporation disturbs the E2 gene consequently resulting in a higher expression of E6 and E7 oncoproteins and leading to cell transformation. After the replication of virus, the L1 and L2 gene products form the virus capsid

and the mature virus is produced. Finally, the virus is released with the help of E4 protein [2-3].

### HPV vaccination and prevention

The HPV vaccine Gardasil 9 protects against infection with nine HPV types: the two low-risk HPV types that cause most genital warts, plus the seven high-risk HPV types that cause most HPV-related cancers. HPV vaccination is recommended by the Centres for Disease Control and Prevention (CDC)'s, Advisory Committee on Immunizations Practices (ACIP) to prevent new HPV infections and HPV-associated diseases, including some cancers. HPV vaccination provides strong protection against new HPV infections, but the vaccine does not cure, and is not used to treat, HPV infections or diseases caused by HPV. HPV vaccination offers the most protection when given before someone is exposed to the virus [4-5].

### Conclusion

Biological studies have elucidated in detail many of the molecular mechanisms of E6 and E7 oncoproteins for altering the regulation of fundamental cellular events, such as cell cycle, apoptosis, differentiation, senescence, cell polarity, and activation of immune-response-related pathways. These studies not only are important for understanding the viral mechanisms but also have significantly contributed to the understanding of cell biology. The epidemiological studies have demonstrated the association of HR. HPV types with pre-malignant and malignant cervical lesions worldwide, highlighting the worldwide predominance of HPV16 and 18 and different

distribution of the other HR HPV types in different geographical areas. Most importantly, these studies have demonstrated that HR HPV infections are also involved in a subset of other genital cancers, i.e. cancers of the vagina, vulva, penis, and anus, as well as cancer of the oro-pharynx.

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