HPV

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**Means of transmission and usual reservoirs**

Human papillomavirus (HPV) is a term that refers to a large group of viruses that cause wart-like growths, called papillomas, or cancers.\(^1\) HPV is known as the most commonly sexually-transmitted disease and has various ways of transmission such as direct sexual contact or through blood. Although unlikely, HPV can also be transmitted to a child from the mother during birth. HPV poses a serious risk to society and according to the CDC, 80 million people in the United States have it. Although viruses in the papillomavirus family can affect other species, humans are the only natural reservoir of HPV since it is very host-specific and tissue-restricted.\(^2\) There are various types of HPV and two categories: high-risk and low-risk. Unfortunately, high-risk may lead to cancer if not cleared fast enough.

**Etiologic agent, general characteristics and key identification tests**

The human papillomaviruses, from the Papillomaviridae family, are the causative agents of Human papillomavirus.\(^3\) HPV is the etiological agent of many cervical cancers as well as some cancers of the uterus, vulva and anus. HPV can also infect the epithelial lining of the genital tract and other mucosal areas of the body.\(^4\) This means that it can only survive in moist places and on the surface of the skin. HPV is a non-enveloped DNA virus that is double stranded and can infect both males and females. A capsid shell encloses its genome, involving structural proteins L1 and L2. A Pap test is used to find cell changes or abnormal cells in the cervix by lightly scraping or brushing off the cervix.\(^5\) These cells are then sent to a lab for observation. In addition, several HPV tests have been approved by the FDA for three cervical screening indications for follow-up testing of women who seem to have abnormal Pap test results.\(^6\) There is also a DNA HPV test approved by the government which is recommended for women over 30. This test checks for genetic material of the papillomavirus through a collection of cells from the cervix.

**Historical information**

For centuries, it has been suspected that warts were caused by some infectious agent.\(^7\) In 1907, human papillomas (i.e. warts) were linked to a virus and human papillomavirus (i.e. HPV) was first isolated in rabbits by Shope, who discovered the first oncogenic strain. No further studies were conducted until the 1970s when Zurhausen linked HPV with cervical cancer and, in the early 1980s, his team isolated several genotypes linked to cervical cancer and genital warts.\(^8\) According to Zurhausen, types 16 and 18 were a direct link to cervical cancer. In the early 1990s, two studies were conducted: one by Mark Schiffman, M.D. and another by a group at the Albert Einstein Cancer Center. Using a new DNA technology, they portrayed that the abnormalities visible in a Pap smear screening were a result of a developing cancer.

**Signs and symptoms of the disease**
Most people do not have any signs or symptoms when they have HPV. However, at times HPV leads to genital warts and in some cases, even cancer. Unfortunately, some may not find out that they have HPV until they have developed serious problems or when they get an abnormal Pap test. According to the CDC, the warts associated with most HPV infections may be painful, itchy or tender, but often go away on their own without any signs or symptoms even though the virus is still in an infected person’s body. As a result, that person may unknowingly pass HPV to sexual partners. This makes this virus scary and a serious risk to society, since people may be carriers for a long time without knowing that they are passing it to others. In addition, they may even be developing cancer the longer an infection goes undiagnosed.

**Microbial virulence mechanisms contributing to the disease process**

Virulence factors affect how bad a pathogen is. According to studies, the virulence factors for HPV are E6 and E7. The viral DNA enters the cells and causes the cell to become carcinogenic, which leads these cells to contain E6 and E7. The viral oncogenes, E6 and E7, are thought to modify the cell cycle so as to retain the differentiating host keratinocyte in a state that is favourable to the amplification of viral genome replication and consequent late gene expression. E6 association with host E6 associated protein, which has ubiquitin ligase activity, act to ubiquitinate p53, leading to its proteosomal degradation.

**Control or treatment for the disease**

There is no specific treatment of HPV if one does not have abnormal changes in the cells, but there is possible treatment for the results of the virus (e.g. the warts or cancer). Treatment for precancerous cervical changes include cryosurgery, LEEP and surgical colonization using a scalpel or a laser. Treatment for warts include topical chemicals, excisional surgery, cryosurgery or laser surgery.

**Current outbreaks or cases, both globally and locally (include prevalence figures for each)**

Since HPV is the most common STD, it has affected people worldwide. Worldwide, 75 – 85% of women have HPV positivity at one point in their life. There are about 79 million Americans that are currently infected with HPV. Each year there are 14 more million that become affected. In fact, according to research HPV is extremely common-almost every person that is sexually active will get HPV at some point.

**Prevention, particularly current research about a vaccine or other means of control/prevention**

Women should have a Pap test every 3 years and use condoms as a preventative measure. There is a vaccine which can be given to children at age 11 or 12, while adults can also get the vaccine up until the age of 26. The vaccine is said to protect against the types of HPV known to be associated with cancer and also to prevent some types that cause warts.

**References used.**