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Pathophysiology of Human Papillomavirus (HPV)

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What is HPV?

- HPV is the most common sexually transmitted virus and can result in various types of cancer in both men and/or anogenital warts in both men and women
- It can be transmitted through intimate skin to skin contact and primarily vaginal and anal intercourse (cdc.gov)
- 14 million men and women are affected yearly in the US (Valentino & Poronsky, 2015, p. 155).
- There are over 100 strains of the virus, but "13 oncogenic HPV types can progress to precancer or cancer" (Viens et al., 2016, p. 661), with HPV 16 as the mostly likely strain to progress to cancer (Viens et al, 2016).
- HPV 16 and 18 cause the majority of cervical, penile and vulvar cancers (McCance & Huether, 2014, p. 424).
- Non-oncogenic, low risk strains, HPV 6 and 11, cause most of the genital wart cases (Bloem et al, 2017).

Risk Factors

- Half of all sexually active people will contract HPV at some point in their lifetime (McCance & Huether, 2014, p. 423).
- Risk factors include unprotected intercourse, numerous sexual partners and age at first intercourse.
- Teens that are sexually active and "young adult females are at a higher risk" (Valentino & Poronsky, 2015, p 155) of contracting the virus, than women and men over 25.
- Those that are immunocompromised, such as young adults with HIV.
- Smokers have higher rates of HPV infection
- Contracting herpes or chlamydia increases the risk of HPV infection "due to inflammation of the epithelial cells and breaks in the epithelial layer that allows a pathway for HPV introduction" (Choma & McKeever, 2015, p. 52).

Signs & Symptoms

- Once infected, many patients remain asymptomatic and most cases resolve on their own.
- The virus can remain dormant for years and then appear untriggered
- Appearance of anogenital warts or an abnormal pap smear are signs of likely HPV infection

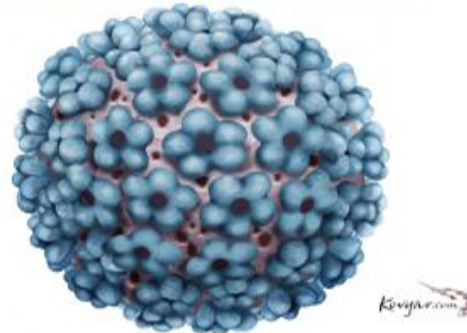


<https://www.choicesmedical.com/who-can-get-the-hpv-vaccine-and-what-does-it-do/>

Underlying Pathophysiology

- The HPV virus is a "small, non-enveloped, double stranded DNA virus that infects the mucosal or cutaneous epithelium" (Valentino & Poronsky, 2015, p. 156).
- Since HPV affects epithelial cells and does not enter the bloodstream, "having an HPV infection in one part of the body should not cause infection in another part (McCance & Huether, 2014, p. 424).
- Once HPV gets into the epithelial cell, "the virus begins to make proteins that can interfere with normal functions in the cell, enabling the cell to grow in an uncontrolled manner and to avoid apoptosis" (McCance & Huether, 2014, p. 424).
- HPV modifies the DNA-damage response (DDR) "pathways by interacting with many proteins, including ATM, ATR, MRN, γ-H2AX, Chk1, Chk2, p53, BRCA1, BRCA2, RAD51..." (Low et al, 2016, p. 28). and a few others.
- The HPV virus "can activate and dysregulate DDR pathways throughout various stages of their life cycles to replicate itself in host cells" (Low et al, 2016, p. 29).
- Cell biology during a different periods of a woman's life can make her more susceptible to contracting the virus (Choma & McKeever, 2015, p.51).

Human Papilloma Virus



<http://www.cmdrc.com/womens-health/sexually-transmitted-diseases-std/hpv/>.

Significance of Pathophysiology

- Understanding the pathophysiology allows for the development of evidence-based screening and prevention tools, thus saving millions of healthcare dollars as well as thousands of human lives.

Nursing Implications

- The main catalyst for a patient receiving the HPV vaccine is "a strong provider recommendation" (Valentino & Poronsky, 2015, p. 155).
- Unfortunately, many health care providers have not acknowledged the life-saving benefits of the HPV vaccine.
- Advanced Practice Nurses play a key role in "education and advocacy for receiving the vaccine" (Valentino & Poronsky, 2015, p. 155).
- APNs must focus their care on what affects young women: "STI screenings, reproductive health needs, lifestyle modifications, and primary prevention, and risk reduction education" (Choma & McKeever, 2015, p 51).

Future Research

- New studies in cervical cancer research illustrate that "therapy directed toward disrupting function of the E6 and E7 oncogenes may help reverse aberrant DDR signaling that occurs as a consequence of HPV infection" (Low et al, 2016, p.31).

Conclusions

- Human papillomavirus is a multi-strain virus transmitted through sexual contact that impacts many types of people, around the world
- HPV "is a major public health concern particularly for adolescents who are disproportionately affected" (Valentino & Poronsky, 2015, p. 162).
- Many strains are preventable through vaccine and others through lifestyle modifications and safe sex practices.
- APNs have a responsibility to educate both men AND women and to dispel any myths around the vaccine that evidence has shown, helps to widely decrease incidence of the virus.

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