UNDER THE MICROSCOPE

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HPV Vaccination

Human papillomavirus (HPV) is a common DNA virus. More than 150 different types of HPV have been identified, and they are designated by numbers. If we take all HPV types into consideration, then HPV infection is almost ubiquitous among human beings. Most HPV types only cause trivial diseases such as common warts, plantar warts and flat warts. Some HPV types are sexually transmitted and cause genital warts, also known as condyloma acuminata. Certain sexually transmitted HPV types cause precancerous conditions, such as cervical dysplasia, which can develop into cervical cancer if left untreated. The relationship between HPV and cervical cancer in women was first discovered in the early 1970's. Since then, Pap smears and other early diagnostic methods have lowered the incidence of cervical cancer from 30,000 cases per year in the 1980's to less than 5,000 cases in 2010. Nonetheless, HPV infection remains as a significant health care challenge. It is estimated that about 79 million Americans are currently infected with sexually transmitted HPV.

Of the many HPV types, HPV-16 and HPV-18 are the ones that most likely cause cervical cancer, and are hence named high-risk HPV. There are a few other less common high-risk HPV's such as HPV-31 and HPV-33. These high-risk HPV's can also cause vaginal, vulvar, penile and anal cancers, and even some cases of oral cancers. Condyloma acuminata are usually cause by so-called low-risk HPV's such as HPV-6 and HPV-11.

The search for HPV vaccine started as soon as HPV was found to cause cervical cancer. Credit for HPV vaccine goes to the University of Queensland scientists Ian Frazer and Jian Zhou, who synthesized virus-like particles (VLP) in vitro to serve as the substrate for HPV vaccine. They received HPV vaccine patents in 1991, and later sold the rights to pharmaceutical companies for commercial development. The first commercial HPV vaccine Gardasil was approved by FDA in 2006. Now there are 3 different HPV vaccines available on the market: Cervarix, Gardasil and Gardasil-9. Cervarix is bivalent and protects again HPV-16/18 only, which are the cause of most cervical cancers. Gardasil is quadrivalent and also protects against HPV-6/11, making it effective for preventing genital warts. Gardasil-9, as the name indicates, covers 9 HPV types by adding HPV-31/33/45/52/58.

CDC recommends routine HPV vaccination to girls and boys at the age 11 to 12, so they can be protected before being exposed to these viruses. Teens and younger adults (up to 26 for women and 21 for men) who have not received this vaccine should also be vaccinated as soon as possible. Since more mature individuals have probably already been exposed to the viruses, vaccination is not recommended for them. The vaccine is given in 3 doses over 6 months. Study shows that protection is almost 100% and lasts for at least 8-10 years.

Recent survey shows that since HPV vaccination was introduced in 2006, there has been a 56% reduction in HPV infection among teen girls. With the increasing rate of vaccination, it is possible that HPV infection will finally become history one day.