

198 Human Papillomavirus Infections

Darron R. Brown, Aaron C. Ermel

Interest in human papillomavirus (HPV) infection began in earnest in the 1980s after Harold zur Hausen postulated that infection with these viruses was associated with cervical cancer. It is now recognized that HPV infection of the human genital tract is extremely common and causes clinical conditions ranging from asymptomatic infection to genital warts (condylomata acuminata); dysplastic lesions and invasive cancers of the anus, penis, vulva, vagina, and cervix; and a subset of oropharyngeal cancers. This chapter describes the epidemiology of HPV as a virus and a pathogen, the natural history of HPV infections and associated cancers, strategies to prevent infection and HPV-associated disease, and treatment modalities for some conditions caused by HPV.

■ PATHOGENESIS



Overview HPV is an icosahedral, nonenveloped, 8000-base-

pair, double-stranded DNA virus with a diameter of 55 nm. Like the genomes of other papillomaviruses, HPV's genome consists of an early (E) gene region, a late (L) gene region, and a noncoding region, which contains regulatory elements. The E1, E2, E5, E6, and E7 proteins are expressed early in the growth cycle and are necessary for viral replication and cellular transformation. The E6 and E7 proteins are responsible for malignant transformation, targeting the human cell-cycle regulatory molecules p53 and Rb (retinoblastoma protein) for degradation, respectively. Translation of the L1 and L2 transcripts and splicing of an E1⁺E4 transcript occur later. The L1 gene encodes the 54-kDa major capsid protein that