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DNA non-enveloped viruses

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Virology, Stephen N.J. Korsman, Gert U. van Zyl, ... Wolfgang Preiser 2012

Jawetz Melnick & Adelbergs Medical Microbiology, Stefan Riedel (Author), Stephen Morse (Author), Timothy Mietzner (Author), Steve Miller.

Viruses, Pandemics, and Immunity, By Arup K. Chakraborty and Andrey S. Shaw

DNA-Non-Enveloped Viruses

1- Adenoviruses
2- Papilloma viruses
3- Parvovirus's

Adenoviruses

Adenoviruses can cause several diseases like keratoconjunctivitis, Hemorrhagic cystitis, Gastroenteritis, and Upper or lower Respiratory tract infection (pharyngitis, pneumonitis, and conjunctivitis).

Properties

1. Double strand DNA linear and non-enveloped
2. Icosahedral nucleocapside
3. They are only viruses with a fiber protruding from each of 12 vertices of the capside, these fibers are: Organs of attachment, has hemagglutinin Ag, and they are toxic to human cells when purified from viruses.

Replication

The virus attaches via fiber on specific receptor, after that it will penetrates the cell. Uncoating and release the viral DNA, and the DNA of virus will go to the nucleus, early transcription by host cell DNA dependent RNA polymerase to formation early mRNA and translated to nonstructural protein (replicating enzyme) also to form viral DNA. mRNA are formed by late transcription, and late translation to structural protein. Assembling occurs in the nucleus then viruses release by cell lysis (rupture).

Transmission and epidemiology

1- You can get it from contact with a person's hands who have touched infected eyes (conjunctiva) or nose or cough mucus. A person with diarrhea can pass the virus on from contact with the stool. A person can get virus from touching surfaces or things a person with infection has coughed or sneezed on or touched
2- They are endemic, worldwide, certain type associated with specific syndromes. For ex. 3,4,7 cause respiratory diseases.

Pathogenesis

They infect mucosal epithelium of respiratory tract (upper or lower), and also cause latent infection particularly in Adenoidal tissue and tonsillar tissue. Conjunctiva and G.I.T. are infected by these viruses.

Clinical finding

In URT: cause Pharyngitis, Pharangio-conjunctiviris, and acute respiratory tract infection which are characterized by fever, sore throat and coryza and conjunctivitis.

In lower RT: cause atypical pneumonia which characterized by fever, path consolidation, and cough.

Hemorrhagic cystitis: characterized by hematuria and Dysuria.

Gastroenteritis: Characterized by bloody diarrhea occur mainly in children under 2 years.

Lab diagnosis

Isolation of the virus on tissue culture

Serology Four fold greater in Ab titer.

Papilloma viruses

Papilloma viruses are benign growths. This means that they do not grow aggressively and they do not spread around the body. The growths only form in certain types of tissue, although these tissues occur all over the body. Papilloma viruses are often known as warts and verrucae when they reach the skin (squamous). Human papilloma virus (Hpv. 16) can cause carcinoma of the cervix.

Properties

1- DS-circular DNA
2- Non enveloped
3- Icosahedral symmetry
4- There are at least 60 types of HPVS
   Skin wart (HPV1 and HPV4)
   Genital wart (HPV6 and HPV11)

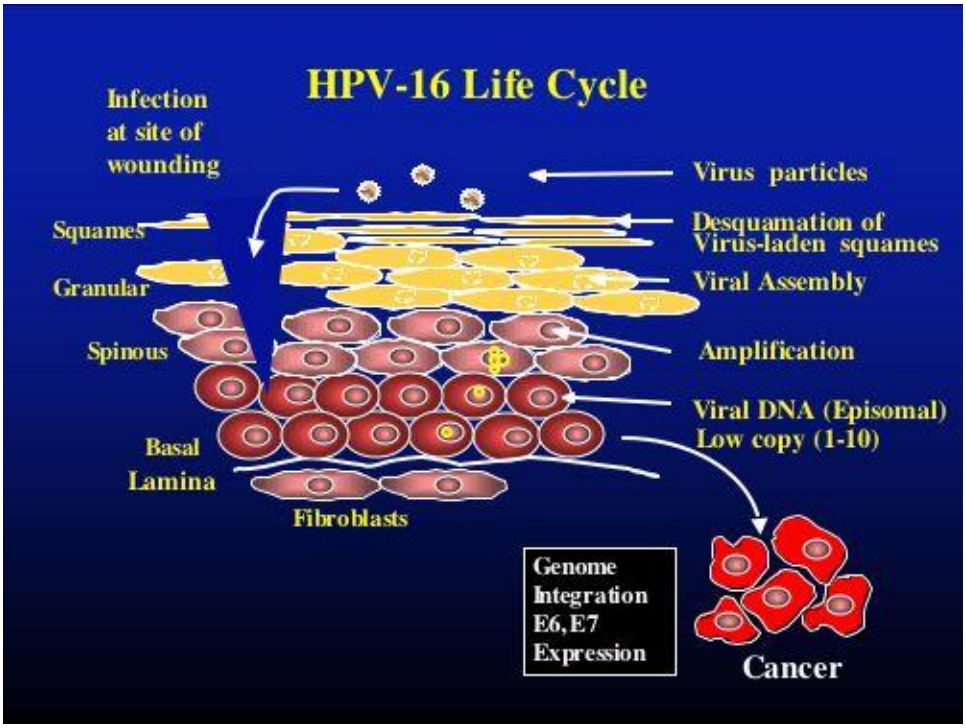
Pathogenesis

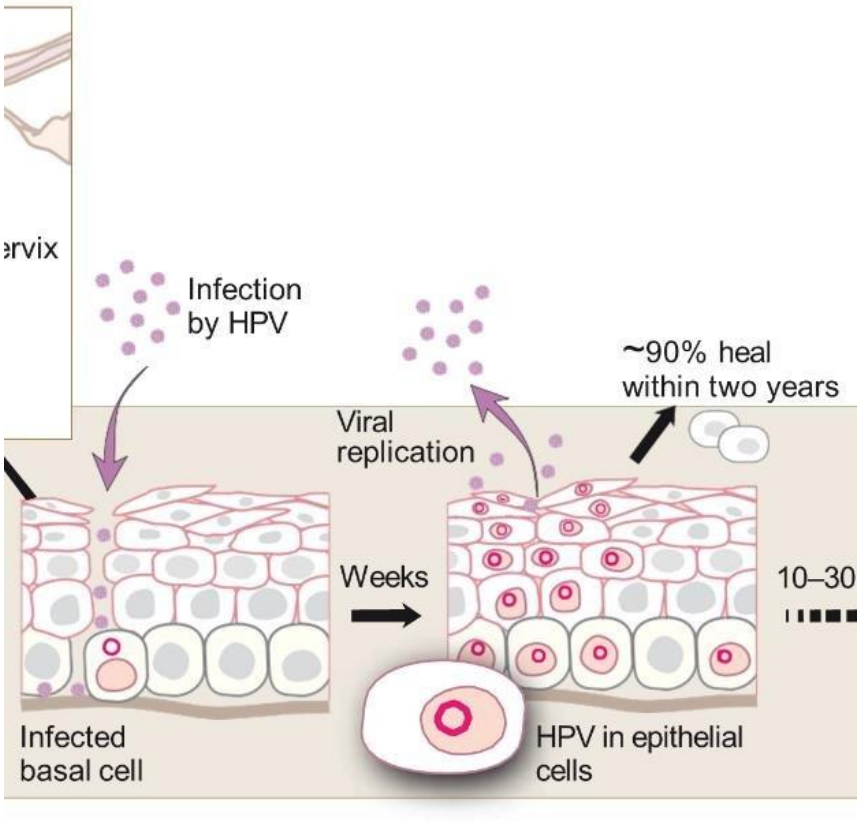
Genus alpha HPVs encodes three viral oncoproteins: E5, E6, and E7. The E6 and E7 proteins encoded by high-risk HPVs are sufficient to be the primary drivers of HPV-related cancers. The best understood function of E7 is its ability to bind and inactivate tumor suppressor genes in human cells e.g. P53 genes and retinoblastoma gene so lead to cancer (benign or malignant).

Replication

The host tissue of human papillomaviruses is the stratified epithelium. This tissue is complex in that it is composed of layered sheets of non-dividing cells in various stages of terminal differentiation, with the uppermost layer being the most differentiated. Only cells of the bottom-most layer of this tissue, the basal cells, proliferate. Although the HPV life cycle begins with the infection of a basal cell, it only comes to

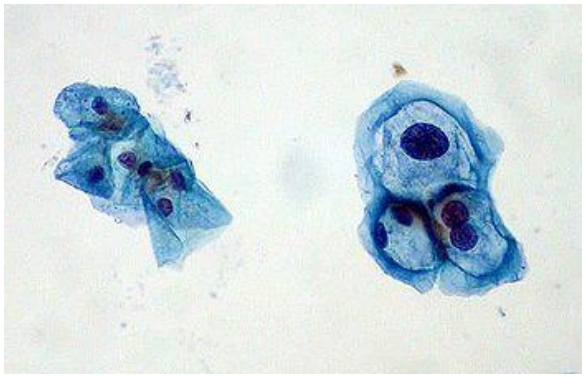
completion when the infected cell reaches the upper layers of the epithelium. As a consequence, the HPV DNA initially finds itself in the nucleus of a proliferating cell, but later in that of a differentiating (non-proliferating) one.





Lab diagnosis

Usually the diagnosis is clinically. Presence of koilocytes vacuoles in the tissue indicates H P V infection.



Serological test is rare

PCR

Treatment and Prevention of HPV

Genital warts use Podophyllin and INF alpha to prevent recurrent

Skin wart use liquid nitrogen

Planter warts: Removal surgically with salicylic acid

Parvovirus

1- SS- linear DNA
2- Icosahedral nucleocapside
3- Serotype B-19 in medically important cause erythema infectious (sclf limited disease) of children characterized by slapped check rash
4- Mainly infect immature RBCS precursor and kill them, this is More sever manifestation is a plastic crisis in the patient with sickle cell anemia.