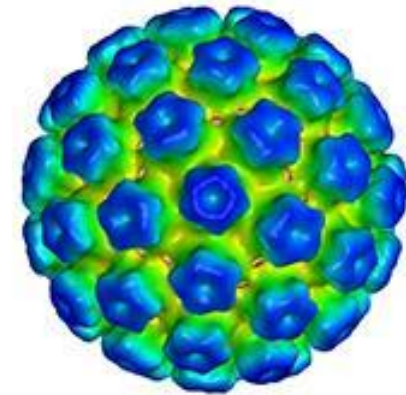


Human papilloma virus



Human papillomavirus is the most common sexually transmitted infection. Most sexually active men and women being exposed to the virus at some point during their lifetime



By

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Properties of HPVs

- ❑ **Family:** Papillomaviridae
- ❑ **Genus:** Papillomavirus
- ❑ **Members:** Human papillomaviruses (HPVs)

HPV was named because of an association with small epithelial proliferations:

'Papilla' = nipple (Latin).

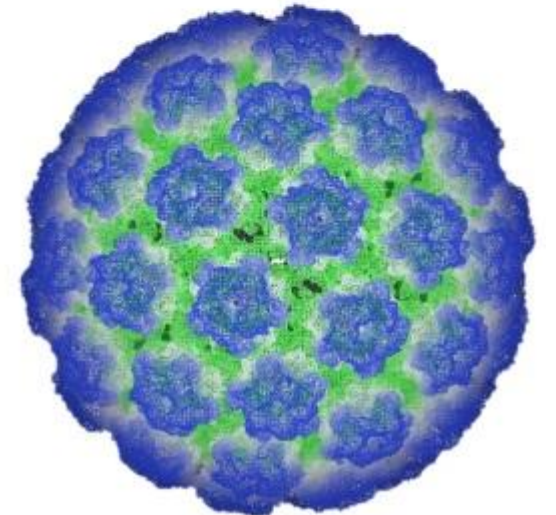
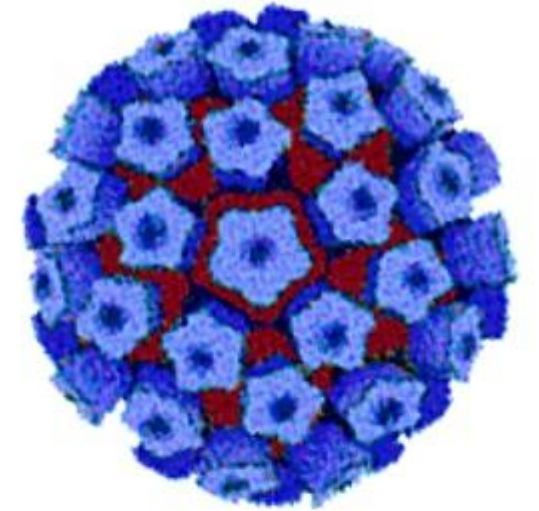
'Oma' = tumor (Greek).

HPVs selectively infect the epithelium of the skin and mucous membranes. These infections may be asymptomatic, produce warts, or be associated with a variety of benign and malignant neoplasias.


>100 HPV types occur.

Structure

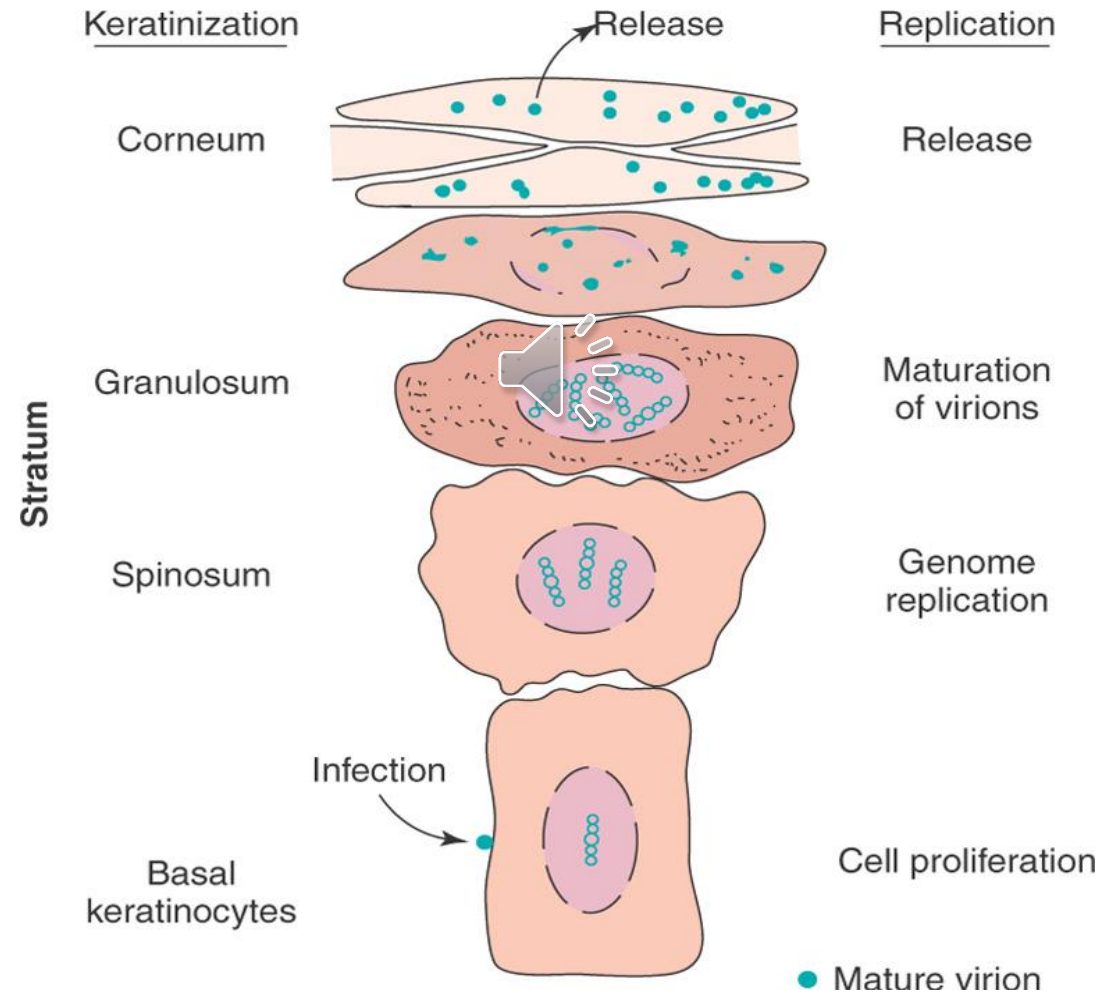
- ❑ small, non-enveloped, icosahedral DNA viruses that have a diameter of 52–55 nm.
- ❑ single double-stranded DNA molecule of about 3000 base-pairs (bp) that is bound to cellular histones a protein capsid composed of 72 **pentameric capsomers**.
- ❑ capsid contains two structural proteins — **late 1 and Late 2** — which are both virally encoded.



HPV Pathogenesis

- ❑ **Source:** skin lesion and genital lesion, new lesions are probably more infective than older.
- ❑ **Transmission:** spread is via direct contact, genital area transmitted via sexual route.
- ❑ **Target:** HPV are highly tropic for epithelial cells of the skin and mucous membrane. All types of squamous epithelium can be infected by HPV. 
- ❑ **Replication of HPV:** begins with the infection of basal cells. As cellular differentiation proceeds, HPV DNA replicates and is transcribed. Ultimately, virions are assembled in the nucleus and released when keratinocytes are shed.
- ✓ This process is associated with proliferation of all epidermal layers except the basal layer and produces hyperkeratosis.
- ✓ Histologically normal epithelium may contain HPV DNA, and residual DNA after treatment can be associated with recurrent disease

HPV Pathogenesis



Clinical Manifestations

❑ Incubation period of HPV disease is usually 3 to 4 months, up to 2 years.

- **These infections may be:**

- 1- Asymptomatic
- 2- Produce warts
- 3- Associated with a variety of benign and malignant neoplasia

❑ The clinical manifestations of HPV infection depend on the location of the lesions and the type of virus.

- **Warts in humans, including:**



- 1- **Skin warts (common warts):** benign, usually occur on the hands as flesh-colored to brown, often regress spontaneously (HPV-2, -4, -27, -57).
- 2- **Plantar warts :** painful (HPV-1).
- 3- **Flat wart:** common among children, face, neck, chest, and flexor surfaces of the forearms and legs (HPV-3, -10, -28).
- 4- **Anogenital warts (genital condyloma):**
 - sexually transmitted genital lesions
 - skin and mucosal surfaces of the external genitalia and perianal areas.
 - caused by specific types of HPVs -6,-11, -40, -42-44, -54, types HPV-16 and HPV-18, regularly become malignant if they persist for a sufficiently long time.
- 5- **Laryngeal papilloma type HPV-6, HPV-11. , children.**



Anogenital Cancers

□ Cervical cancer:

Strong association: HPV-16, 18, 31, 45

Moderate association: HPV-33, 35, 39, 51, 52, 56, 58, 59, 68

Weak or no association: HPV-6, 11, 26, 42, 43, 44, 53, 54, 55, 62

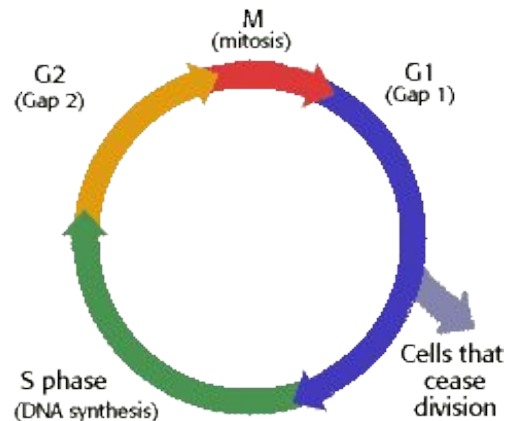
□ Vulvar cancer: HPV-16

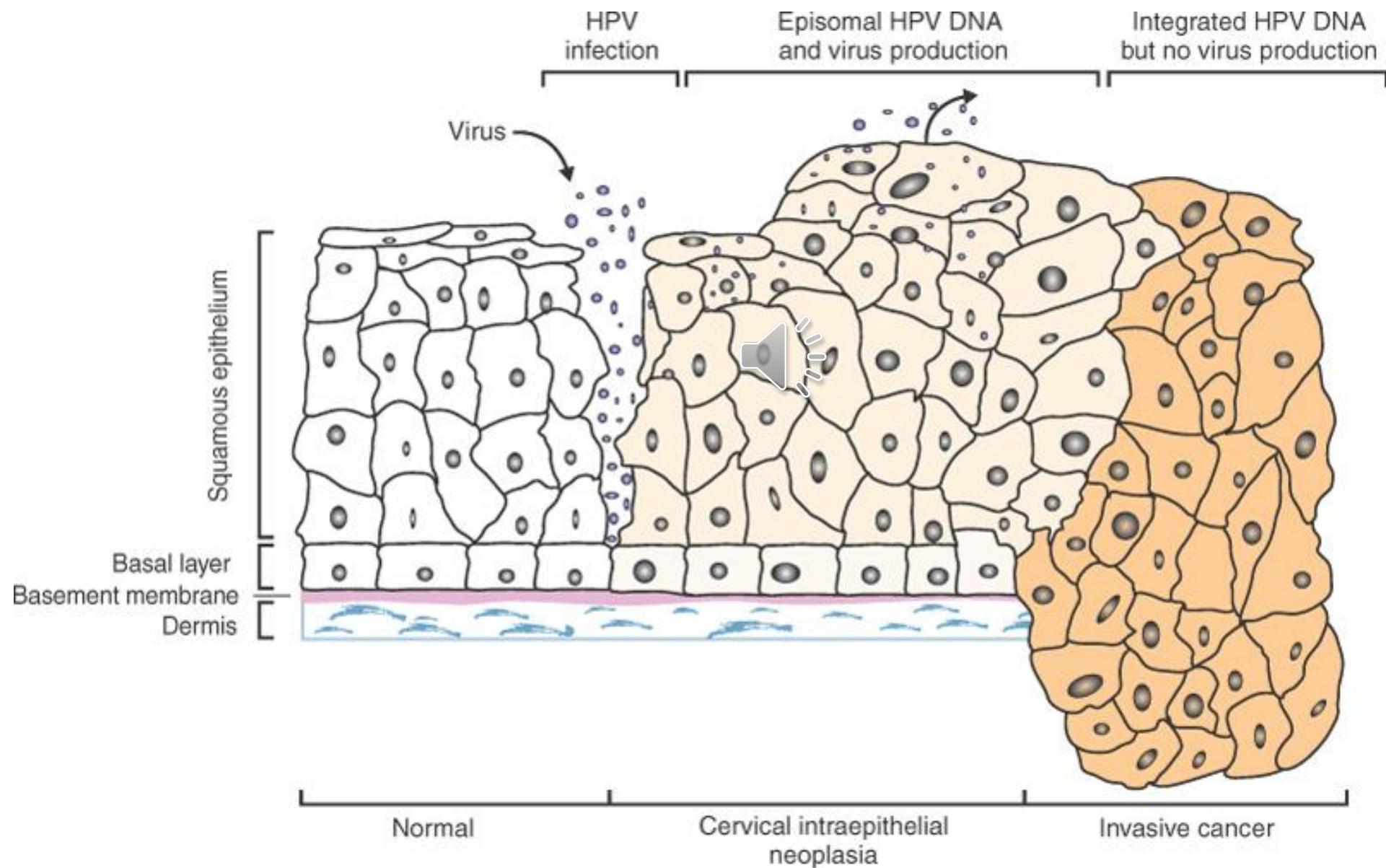
□ Penile cancer: HPV-16

How Does HPV “Cause” Cancer?

□ In high-risk HPV strains 16, 18, 31, 39, 45 and 59:

- ✓ Protein E6 interacts with p53 in the host cell and promotes its degradation via the ubiquitin dependent pathway.
- ✓ Protein E7 complexes with retinoblastoma protein (Rb), thereby inactivating it.





The Bad News

❑ Cervical cancer is the second leading cause of cancer death among women world wide.



❑ An estimated 75% of women in the U.S. will be exposed to HPV at some point in their lives.



...The Good News

- ❑ 90% of women infected with HPV clear the infection through natural means within two years.
- ❑ It may take 10 to 15 years for an HPV infection to develop into cancer.
- ❑ Vaccines are currently in development against oncogenic strains.

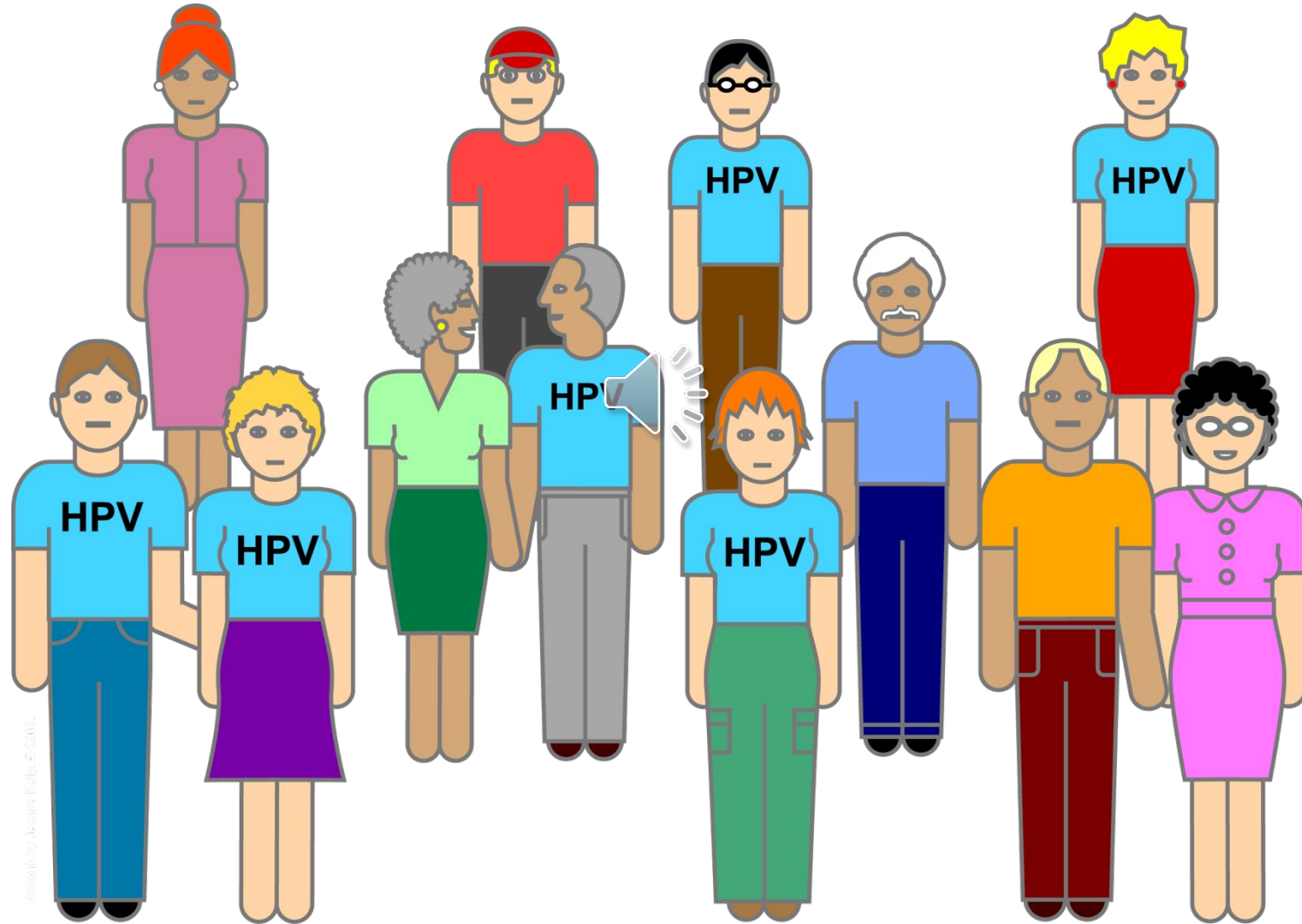


Risk Factors for Acquiring a Genital HPV Infection

- Young age (less than 25 years)
- Multiple sex partners
- Early age at first intercourse (16 years or younger)
- Male partner has (or has had) multiple sex partners

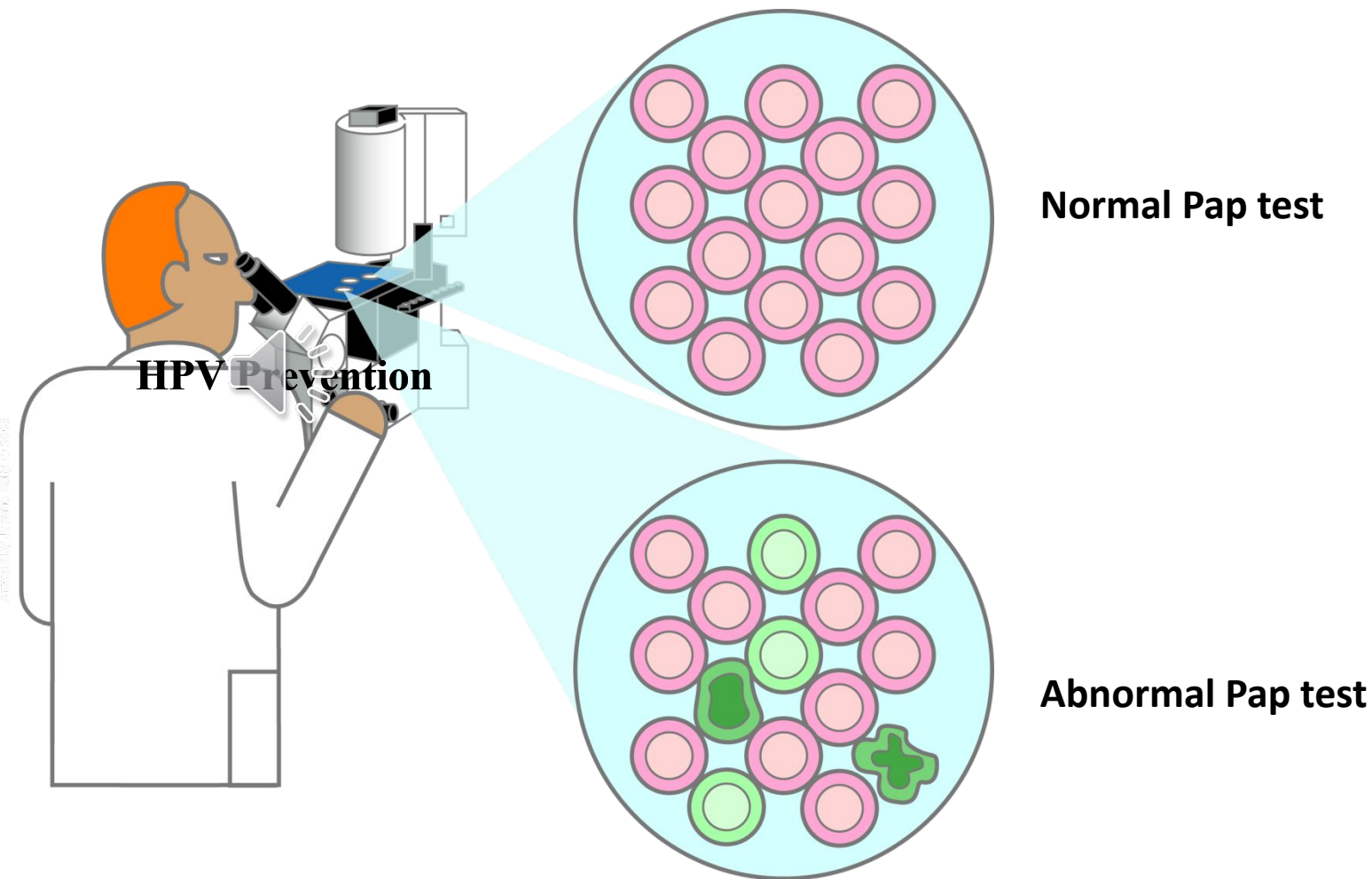
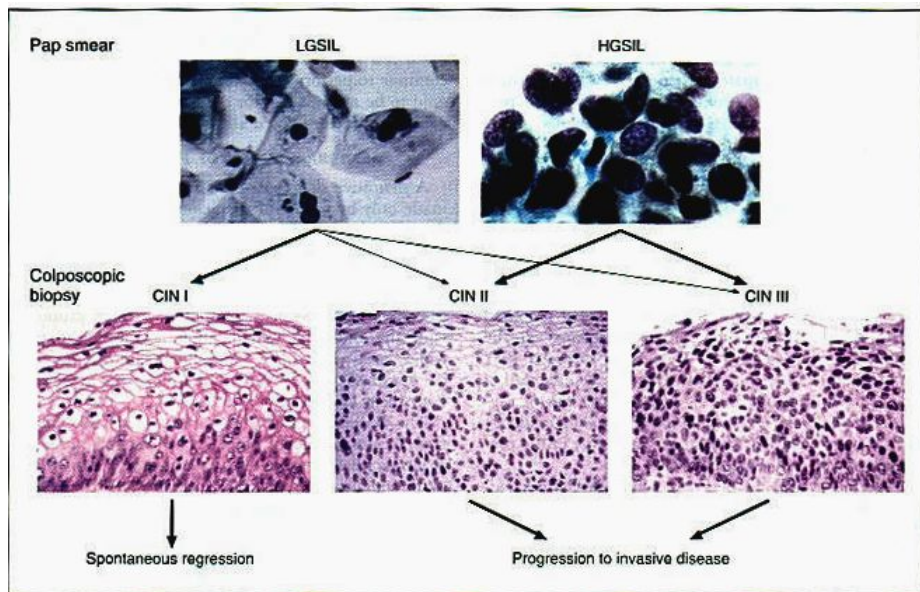


Infection Is Sexually Transmitted



HPV Diagnostic Techniques

- History
- Visual exam
- Pap smears
- DNA testing



HPV Prevention

- Abstinence
- Monogamy
- Condoms
- Removal of warts
- Vaccine (females aged 9-26)



50% to 70% of sex partners of people with genital warts already have or do develop warts.

For more info...

- **Jawetz-Medical-Microbiology-2019-28th-edition**
- **Medical-Microbiology-Murray-2021-9th-edition**

Good Luck