1 Papilloma Viruses

A group of over 300 viruses (200 affect humans)

Vast majority of HPVs are asymptomatic

Some cause genetal / skin warts or carry a risk of becoming cancerous

2 Human Papillomaviruses (HPVs)

HPVs are the most commonly sexually transmitted infection in the US

>80% of men and women will be infected with at least one type in their lives

Most people are asymptomatic and will clear the infection, usually within 2 years

HPV causes:

1. Virtually all cases of cervical cancer
2. 95% of anal cancers
3. 70% of throat cancers

2.1 Types of HPV

2.1.1 Low-Risk Papilloma

Generally asymptomatic, but can lead to genital warts (HPV6 and HPV11)

2.1.2 High-Risk HPV

Can lead to extensive cervical dyspasia and certain cancers

HPV16 and HPV18 cause 70% of HPV-related cancers

2.2 Initial Infection

HPV enters during sex through small abrasions

Virus pushes cell hyper-replication to support its replication (cause of warts)

∼90% of infected people heal within 2 years

2.3 DNA Integration

Occasionally, HPV DNA is integrated into tumor cell DNA

Not a normal part of the virus' life cycle

0.8% of cases develop cancer

2.4 Prevention

Safe sex practices are not 100% effective

Pap smear and HPV tests can detect abnormal cell proliferation in the cervix and determine the type of HPV

2.5 Virion

Small viruses (50 nm) with DNA genome

L1 protein capsid (no lipid envelope)

2.5.1 HPV Vaccines

Made of L1 protein to protect against common HPVs

→ Naturally assembled to form virus-like capsids (empty virions)

2.6 Genes Linked to Cancers

Proto-oncogenes: Proteins that normally contribute positively to cell proliferation

Mutations might prevent proto-oncogenes preventing them from being turned off

→ Called **oncogenes**

Tumor suppressor genes: Protein that prevent the unwanted proliferation of mutant cells

Mutation might render these genes ineffective

2.6.1 HPV E6/E7 Oncogenes

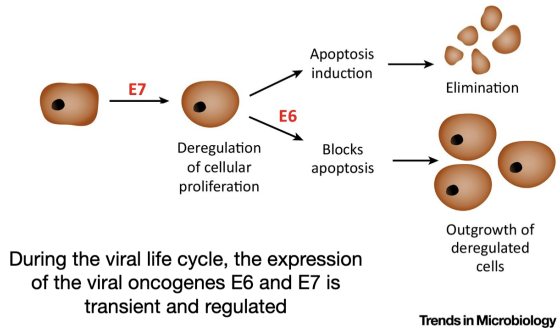

Figure 1: HPV E6/E7 Oncogenes

E6 and E7 are part of the viral genome and become cancerous when integrated into the human cell genome

2.7 Cervical Cancer

Integration results in dysregulation of E6 and E7 oncogenes

Integration is a genetic accident (Dead end for virus as it is no longer able to transmit to new host)

Gives cells a selective growth advantage, but does not necessarily cause cancer immediately

Takes 15-20 years for cervical cancer to develop in women with normal immune systems (5-10 years with weakened immune system)

Can also cause oral cancers (mouth, tongue, oropharynx), anal cancers, vulvar and vaginal cancers, penile cancers