

# Human Papilloma Virus (HPV)

## Name(s)

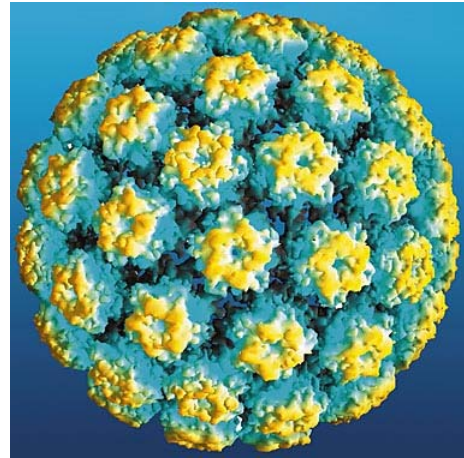
- HPV, Human Papilloma Virus, condyloma, genital warts, venereal warts

## Type of Virus

- icosahedron, star shaped capsomeres

## Description/Statistics

- there are up to 200 types of HPV
- 
- ~40 types are transmitted sexually
- ~15 types can cause sexually transmitted cancers (3-4 types are "high risk")
- ~20 million new sexually transmitted infections per year in US
- ~110 million total sexually transmitted infections in US
- ~\$16 billion in medical costs per year in US to treat these STI's
- most common STI ( ) by far!
- most people don't know that they have the sexually transmitted form (~half of all adults have it at any one time, almost everyone will get it sometime if sexually active!)



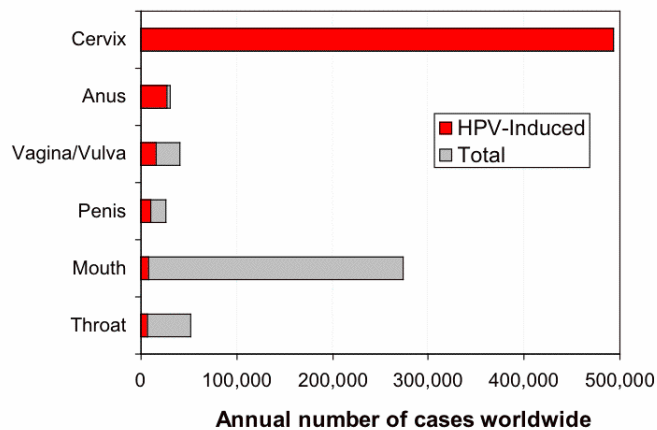
## Transmission

- skin to skin contact
- 
- sexual activity
  - genital warts are very contagious
- 
- blood (?)

## Symptoms

- most infections are subclinical ( )
- immune system normally clears the virus (could take months or even years)
- warts ( ) on skin and mucous membranes
- genital HPV not always apparent ( )

- cancers of the: cervix, vulva, vagina, penis, anus, throat
  - almost all cancers of the cervix and anus are caused by HPV
  - ~half of all cancers of the vulva/vagina and penis are caused by HPV
- ~half of all cervical cancer cases worldwide end in death
- Men who are not circumcised are more likely to get and stay infected with HPV
  - circumcision reduces risk of penile cancer ( )



### Treatment/Prevention

- visible warts can be frozen ( )
- burned off with acids or electrocauterization
- 
- certain topical agents (either destroy infected tissue or create irritation that alerts immune system)
- condoms (not perfect - fingers and tongues not wearing condom)
- vaccination

### Controversy

#### HPV Vaccine

- Gardasil, Cervarix
- 
- this vaccine protects against the 4 types of HPV most associated with the above-mentioned cancers and genital warts
- recommended for teenage girls (starting age 9) and young women up to age 26
  - more cost effective for population when women vaccinated
- also recommended for males age 9-26

- may be used in women older than 26 if no prior HPV infections exists
- insurance companies don't want to cover the cost of vaccination (prevention always cheaper than treatment!)
- religious/conservatives don't like the government mandating vaccination – interferes with parental rights
- religious/conservatives believe vaccination against HPV promotes sexual activity in young people (American Academy of Pediatrics disputes that claim)
- immigrants once required to have HPV vaccination to enter US but that requirement repealed
- the usual criticisms against vaccines from anti-vax groups

## Herpes

### Name(s)

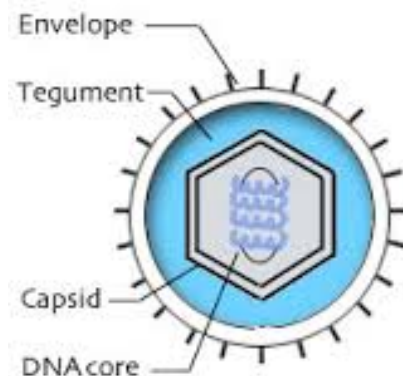
- STI – genital herpes, Herpes simplex, HSV-2, HHV-2

### Type of Virus

- icosahedron with membrane envelope

### Description/Statistics

- 
- HHV 1&2 ( ) – oral and genital herpes
  - blisters on skin and mucous membranes
  - fever blisters, cold sores ( ), genital lesions ( )
  - ~25%-50% of women in US infected with genital herpes (numbers vary relative to location, e.g. inner city, suburbs, rural areas)
  - infection rates for males generally half what they are for females
  - the virus hides in nerves where drugs and the immune system cannot reach them
- HHV-3 thru 8- very prevalent in population, infection rates range from ~50%-100%
  - manifestations include: chicken pox, shingles, Burkett's lymphoma, and chronic fatigue syndrome
  - most of these lifelong infections are asymptomatic after the initial infection and kept under control by a healthy immune system
- once you are infected with a herpes virus, you are infected life!



## Transmission

- most herpes viruses are transmitted by saliva
- most herpes infections acquired when young
- HSV-1 and HSV-2 transmitted by sexual contact, skin to skin contact
- transmission via objects possible ( )

## Symptoms (HSV-1&2)

- In women, blisters may be on the outer vaginal lips (labia), vagina, cervix, around the anus, and on the thighs or buttocks.
  - In men, blisters may be on the penis, scrotum, around the anus, on the thighs or buttocks.
  - In both genders, blisters may be on the tongue, mouth, eyes, gums, lips, fingers, and other parts of the body.
  - Before the blisters appear, there may be tingling, burning, itching, or pain at the site where the blisters will appear.
  - When the blisters break, they leave shallow ulcers that are very painful. These ulcers crust over and heal in 7 to 14 days or more. (MedlinePlus)
- women often do not know they have herpes ( )

## Treatment/Prevention

- 
- antiviral drugs – Valtrex, Zovirax
  - these drugs reduce number of outbreaks and duration, they do not cure herpes! (Remember: you are infected forever!)
- immune system controls virus over time, number of outbreaks decreases and duration decreases
- circumcision may reduce risk ( )
- 

## Controversy

- spreading herpes by not asking or telling partners that you have genital herpes
- herpes infections may enhance immune response and protect individuals from bacterial infections like bubonic plague

## Mini-Lecture: Scientific Method

### Scientific Inquiry

- What does science prove? ( ).
- Science leads to better understanding of the natural world through observations and conclusions based on objective testing.

The process of making observations, testing them and drawing conclusions from those tests = the scientific method.

### **Scientific Method**

- 1) Observations - what do you see? Do you notice any patterns? Define a problem or ask a question.
- 2) Hypothesis - make a prediction about what you expect to occur based on your observations
  - hypotheses can be in the form of an "if, then" statement
- 3) Test your hypothesis. Design an experiment.
- 4) Conclusion: Do the results support your hypothesis? If the hypothesis is true, then the outcome (prediction) would be expected. If not, why not? Maybe reevaluate your hypothesis. Hypotheses can only be proven false.

### **Other Considerations**

#### **Controls and Variables**

- ideally test only one variable at a time
  - control group is same as experimental group except for the variable being tested
- controls insure that the variable is the only factor influencing the result, if controls show "effects" then something else besides the variable being tested is influencing results
- 

### **Study Objectives**

1. **What does subclinical mean?**
2. **Describe a wart.**
3. **Describe the symptoms of HPV.**
4. **Describe how human papilloma viruses' are transmitted.**
5. **How can HPV transmission be reduced/prevented?**
6. **Why is the HPV vaccine controversial?**
7. **How many human herpes viruses are there?**
8. **Describe the symptoms of HSV-1&2.**
9. **Describe how herpes viruses' are transmitted.**
10. **How can herpes virus transmission be reduced/prevented?**
11. **What does science prove?**
12. **Describe the 4 steps of the scientific method.**
13. **What is a control?**
14. **Why is it necessary to test for only one variable at a time?**