

# Human Herpes Viruses (HHV)

*Mazin Barry, MD, FRCPC, FACP, DTM&H*

*Assistant Professor and Consultant Infectious Diseases*

*KSU*

# HERPES VIRUS INFECTIONS

- objectives:

- To know the clinically important HHVs.
- To know the common characteristics of HHVs.
- To know the common modes of transmission of different HHVs
- To know the clinical features of these infections, diagnostic methods and treatment.

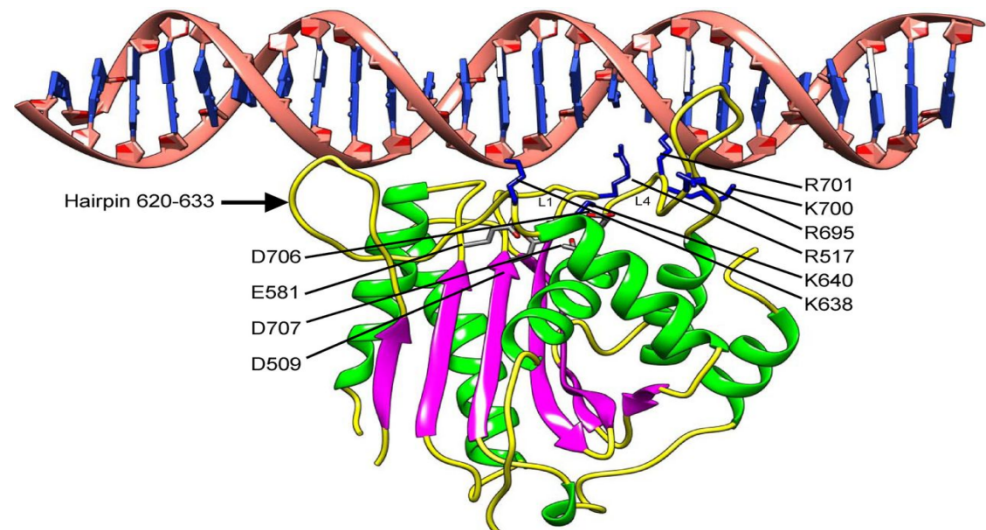
# HERPES VIRUSES

- **Herpes Simplex Virus type1 (HSV-1)**
- **Herpes Simplex Virus type2 (HSV-2)**
- **Varicella Zoster Virus (VZV)**
- **Cytomegalovirus (CMV)**
- **Epstein-Barr Virus (EBV)**
- **Human Herpes Virus 6 (HHS-6)**
- **Human Herpes Virus 7 (HHS-7)**
- **Human Herpes Virus 8 (HHS-8)**

# HERPES VIRUSES

## Characteristics:

- All DNA viruses
- All encapsulated
- All have latency after the initial infection
- Mostly require close contact for transmission
- Human is the only reservoir

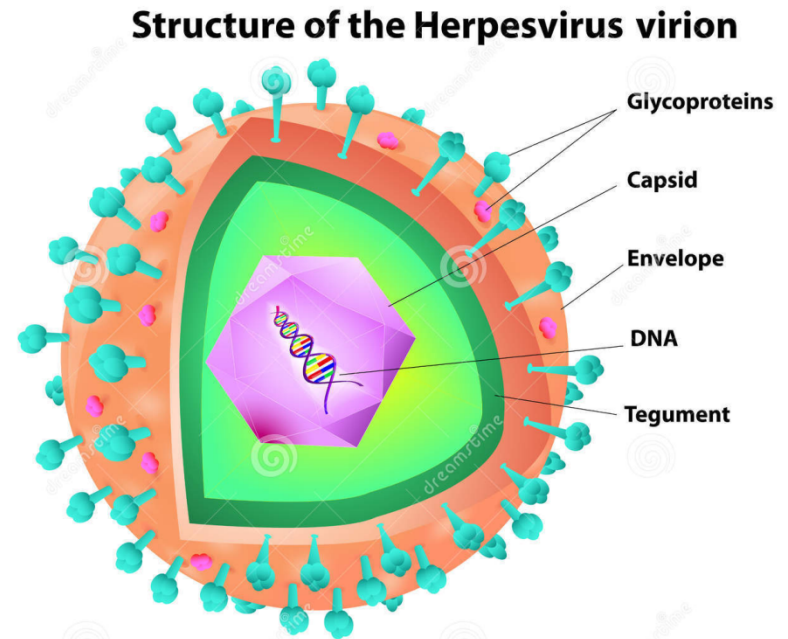


<b>Virus</b>	<b>Infection</b>
<b>HSV Type 1</b>	Herpes labialis ('cold sores') Keratoconjunctivitis Finger infections ('whitlows') Encephalitis Primary stomatitis Genital infections
<b>HSV Type 2</b>	Genital infections Neonatal infection (acquired during vaginal delivery)
<b>Varicella zoster virus (VZV)</b>	Chickenpox Shingles (herpes zoster)
<b>Cytomegalovirus (CMV)</b>	Congenital infection Disease in immunocompromised patients Pneumonitis Retinitis Colitis systemic infection
<b>Epstein-Barr virus (EBV)</b>	Infectious mononucleosis Burkitt's lymphoma Nasopharyngeal carcinoma Oral hairy Cell leucoplakia (AIDS patients)
<b>Human herpes virus 6 (HHV-6) and 7 (HHV-7) Roseolovirus</b>	Exanthem subitum (Roseola): three day fever ? Disease in immunocompromised patients
<b>Human herpes virus 8 (HHV-8)</b>	Associated with Kaposi's sarcoma

# HERPES VIRUSES

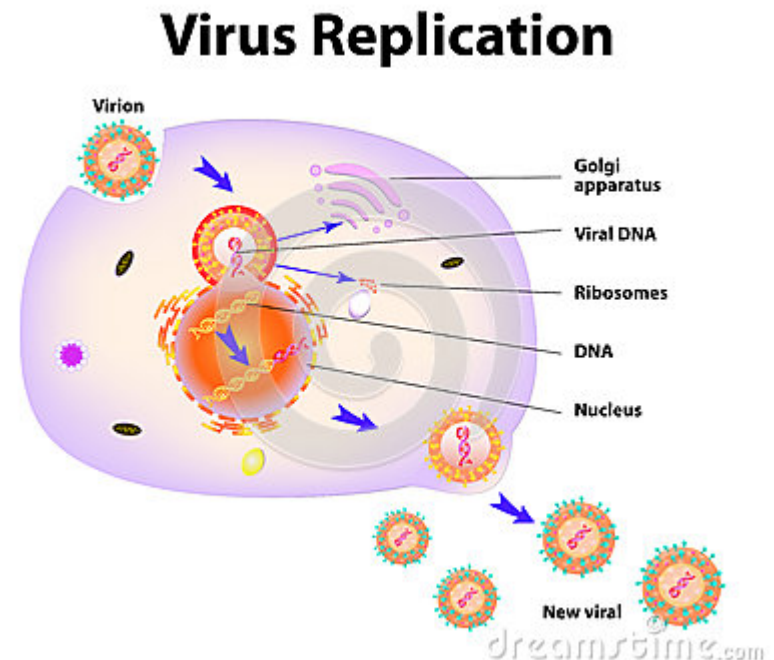
## Structure

- Herpesviruses have a unique four-layered **structure**:
  - A core containing the large double-stranded DNA genome
  - Genome is enclosed by an icosapentahedral capsid which is composed of capsomers
  - The capsid is surrounded by an amorphous protein coat called the tegument
  - It is encased in a glycoprotein-bearing lipid bilayer envelope



# Viral Replication

- Upon entry into the host cell nucleus, three distinct phases of gene transcription and protein synthesis are initiated producing the immediate-early, early, and late proteins
- Viral nucleocapsid assembly occurs within the host cell nucleus.
- The virus acquires its final envelope by budding into cytoplasmic vesicles



# HERPES VIRUSES

- **HSV-1 vs HSV-2**

Non-genital vs Genital Herpes infection

Primary vs Recurrent infections

Neonatal infection



# HERPES VIRUSES

- Transmission is by close contact with body secretions
- Exposure to HSV at mucosal surfaces or abraded skin sites permits entry of the virus and initiation of its replication in cells of the epidermis and dermis
- After initial infection the virus infects the sensory and autonomic nerves and become dormant in the ganglion (trigeminal nerve for HSV1 and sacral root for HSV2)

# HSV Gingivostomatitis

**Gingivostomatitis and pharyngitis are the most frequent clinical manifestations of first-episode HSV-1 infection**



# Herpes Labialis

**Recurrent herpes labialis is the most frequent clinical manifestation of reactivation HSV infection**



# NON-GENITAL HSV





# GENITAL HSV

**Fever, headache, malaise, and myalgias. Pain, itching, dysuria, vaginal and urethral discharge, and tender inguinal lymphadenopathy**



- Small, painful sores or blisters
- Usually heal in 1-3 weeks
- Can come back weeks, months, or years later
- Sexually transmitted virus



# Genital HSV



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**Herpetic ulceration of the vulva**

**Penile herpes simplex (HSV-2) infection**

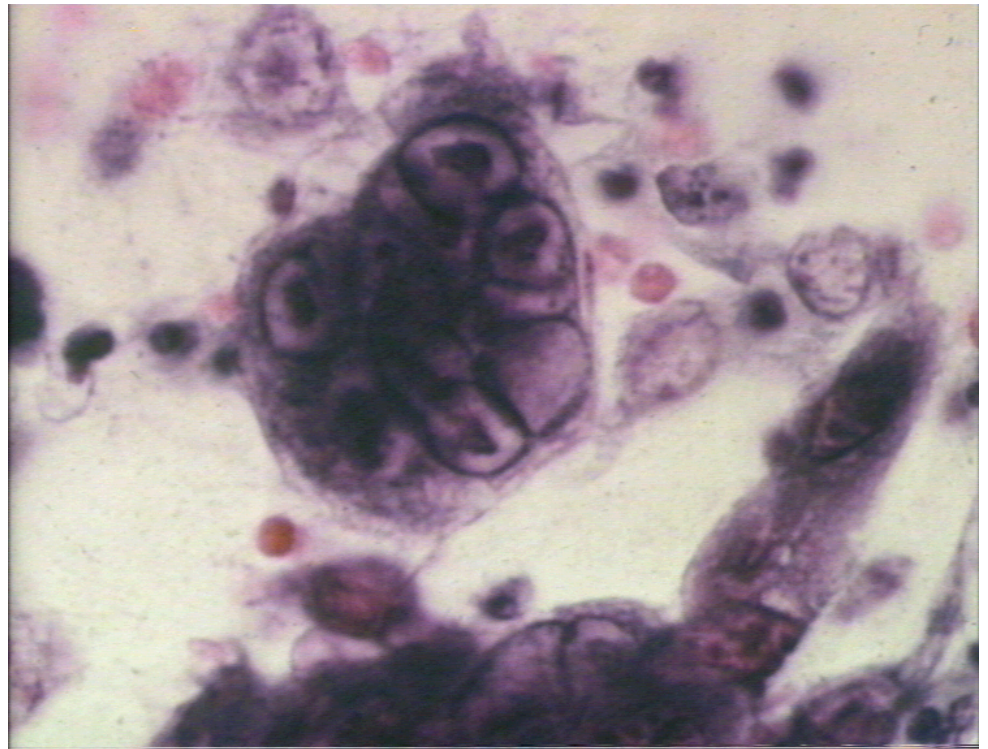
# GENITAL HSV





# Diagnosis of HSV

- Clinical picture
- Viral culture
- Cytology
- Serology
- PCR





# HSV TREATMENT

- Acyclovir, PO, IV, topical
  - Penciclovir topical
  - Famciclovir PO
  - Valacyclovir PO
- 
- Route, dose, duration depends on clinical picture and whether immunocompromised or competent

# VARICILLA ZOSTER VIRUS (VZV)

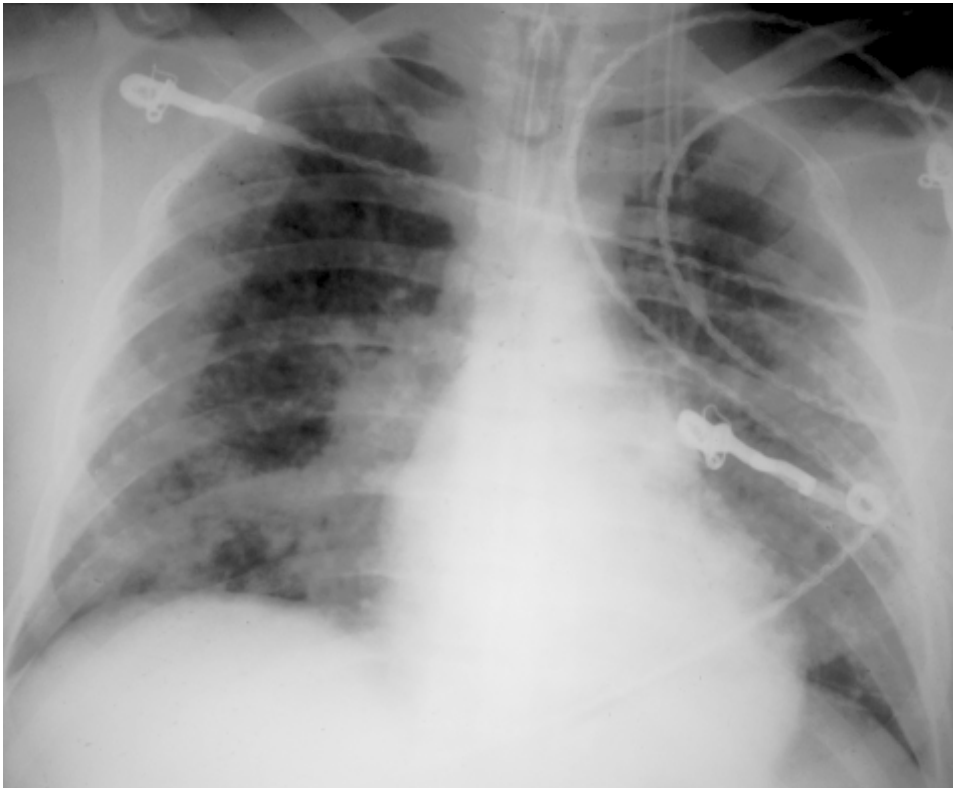
- Primary infection  
    Chickenpox
- Recurrent infection  
    Herpes zoster (shingles)

# VARICILLA ZOSTER VIRUS

- The virus is spread by the respiratory route ( airborne and contact) and replicates in the nasopharynx or upper respiratory tract.
- Followed by localized replication at an undefined site, which leads to seeding of the reticuloendothelial system and, ultimately, viremia.
- The virus establishes latency within the dorsal root ganglia.

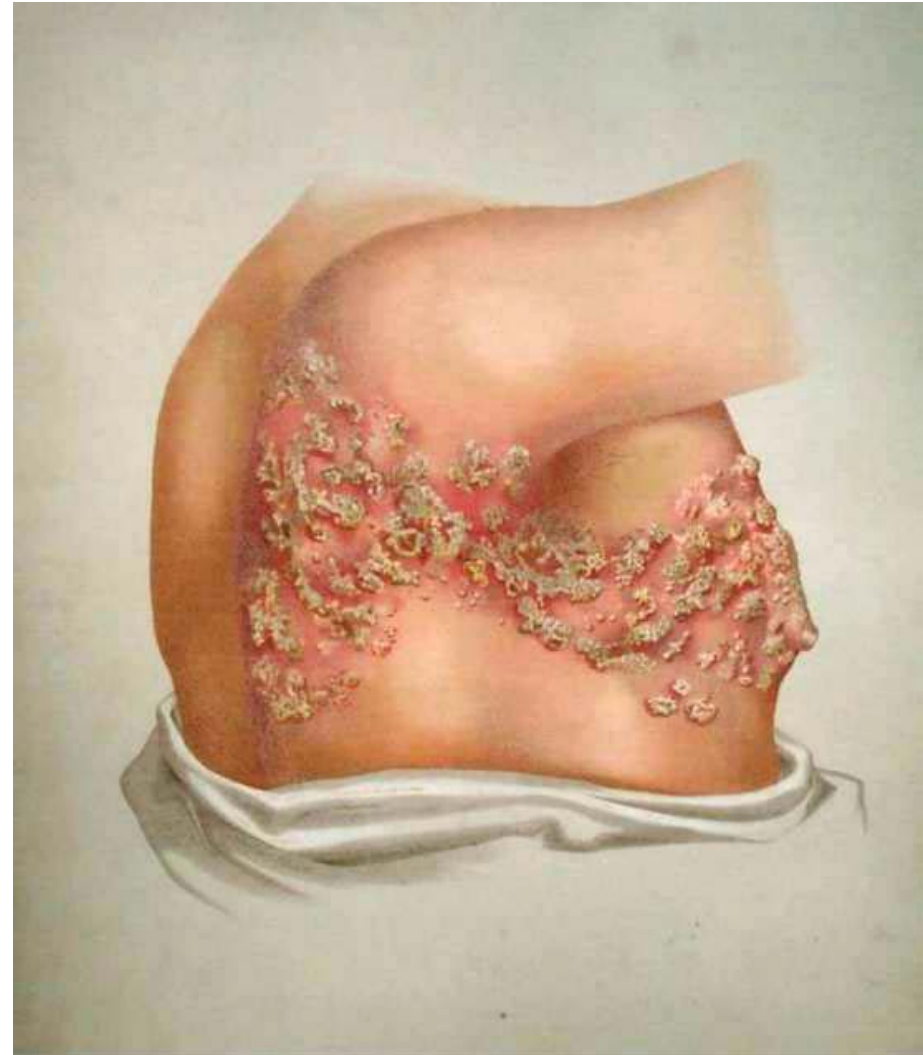
# CHICKENPOX

Overall, chickenpox is a disease of childhood, because 90% of cases occur in children younger than 13 years of age.



# VARICILLA ZOSTER

Reactivation of VZV leads to VZ

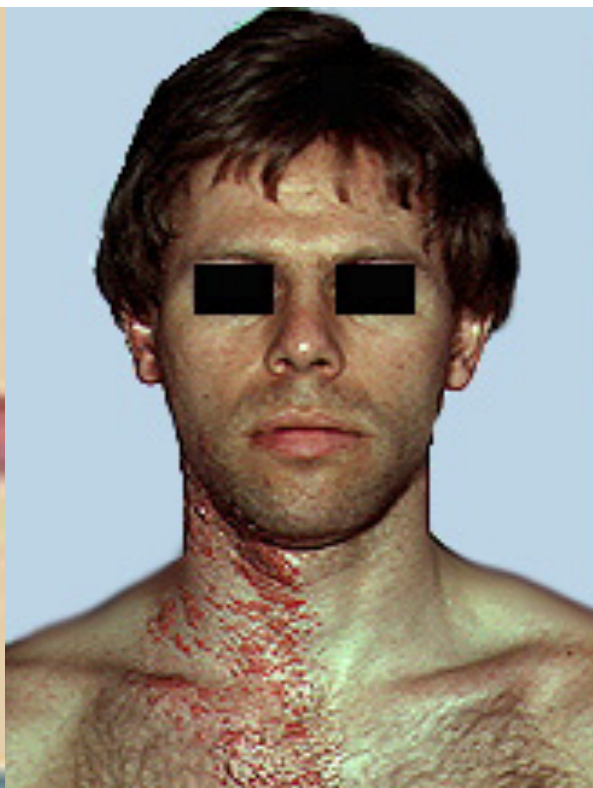


# VARICILLA ZOTER





# VARICILLA ZOSTER



# VARICILLA ZOSTER





# VARICILLA ZOTER



# VZV Diagnosis

- Clinical picture
- Viral culture
- PCR
- Serology



# VZV treatment

- Acyclovir
- Valacyclovir
- Famciclovir

## **Prevention**

VZV vaccination

VZV immunoglobulin (VZIG)

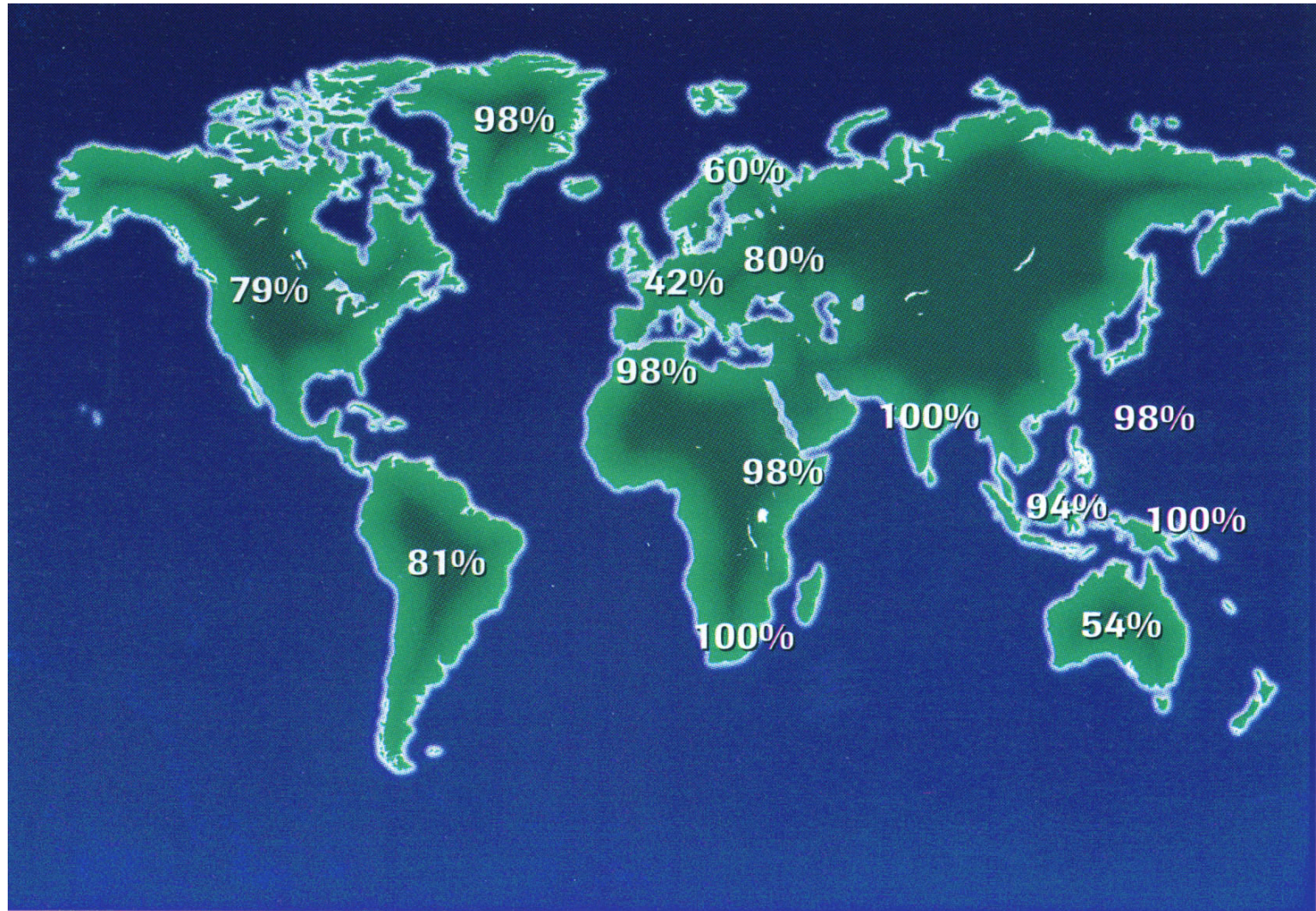
# Cytomegalovirus (CMV)

- The largest virus that infects human beings
- World wide distribution
- Latency after primary infection
- Infection ranges from asymptomatic to severe multisystemic disease



# CMV

## Seroepidemiology



# Cytomegalovirus (CMV)

## Primary infection

Asymptomatic

Infectious mononucleosis

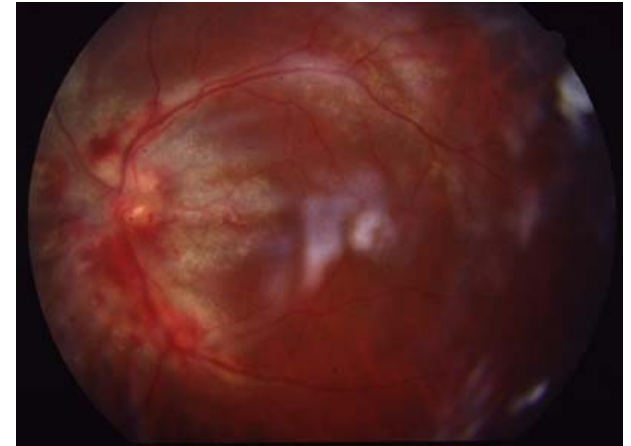
## Secondary infections in Immunocompromised patients:

Pneumonitis

Retinitis

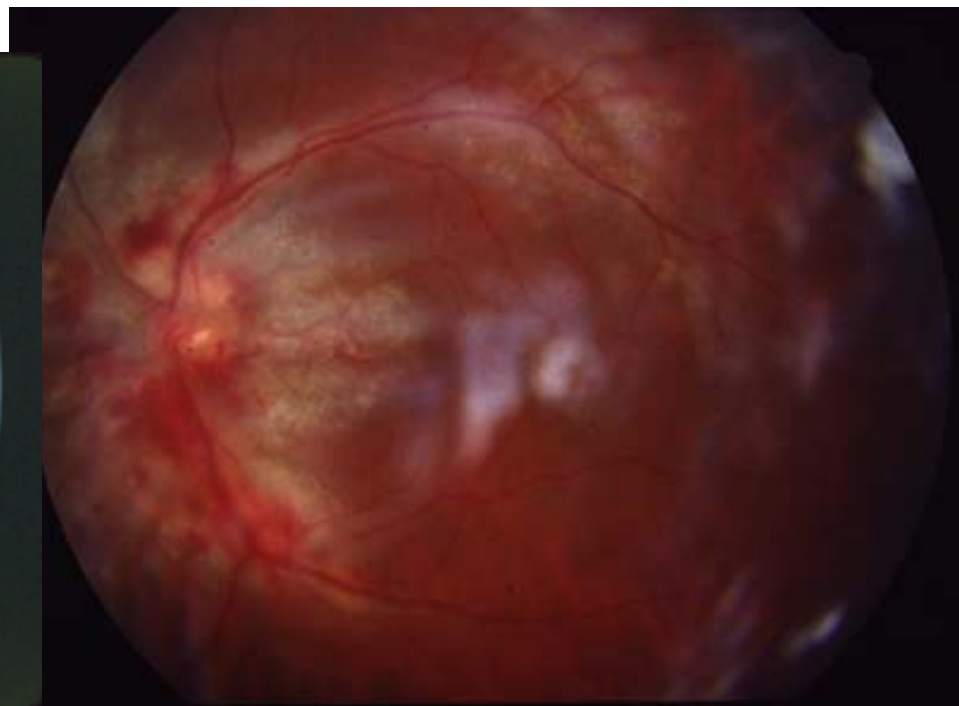
Colitis

Multisystem





# CMV Retinitis



# Cytomegalovirus (CMV)

## Diagnosis

Diagnosis almost always depends on laboratory confirmation and cannot be made on clinical grounds alone.

- ◆ Viral cultures from blood ,urine ,tissue.
- ◆ Serologic tests (antigen detection)
- ◆ PCR



# Cytomegalovirus (CMV)

## TREATMENT

**ganciclovir**

**foscarnet**

**cidofovir**

# Epstein-Barr Virus (EBV)

- Ubiquitous human herpes virus.
- By adulthood 90 to 95% of most populations are positive.
- Spread occurs by intimate contact between susceptible individuals and asymptomatic shedders of EBV.
- Mostly causes asymptomatic infections.
- Strong association with African Burkitt's lymphoma and Nasopharyngeal carcinoma.

# Epstein-Barr Virus (EBV)

## Infectious mononucleosis

### Clinical

Fever, Sore throat, Lymphadenopathy

### Hematologic

>50% mononuclear cells

>10% atypical lymphocytes

### Serologic

Transient appearance of heterophile antibodies (weak antibodies)

Permanent emergence of antibodies to EBV

# Epstein-Barr Virus (EBV)

## Diagnosis:

**Heterophile Antibodies (monospot test) 70–92% sensitivity and 96–100% specificity**

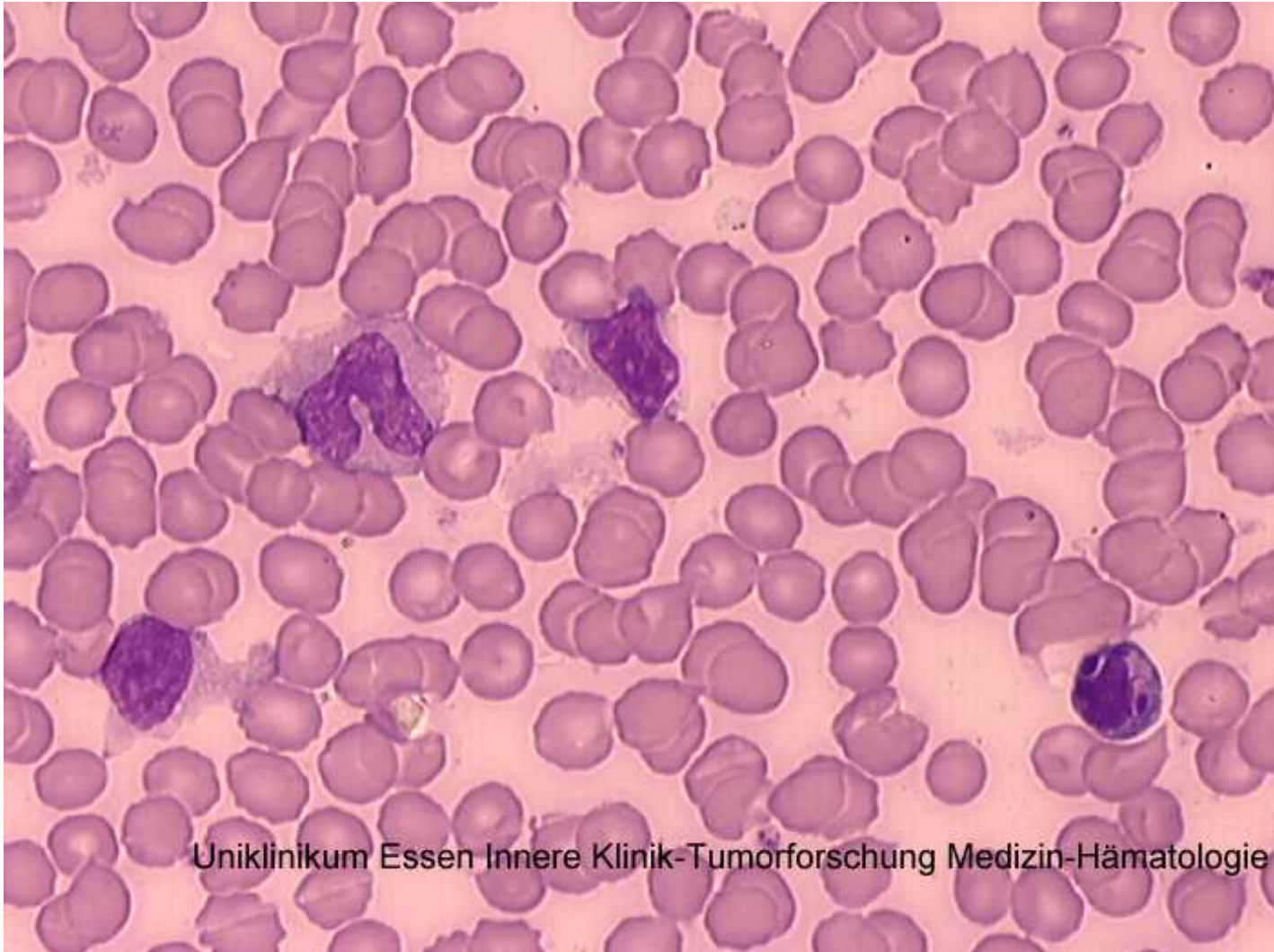
## Hematologic Findings

**Lymphocytosis, neutropenia, thrombocytopenia**

**EBV specific antibodies**

# EBV Infection

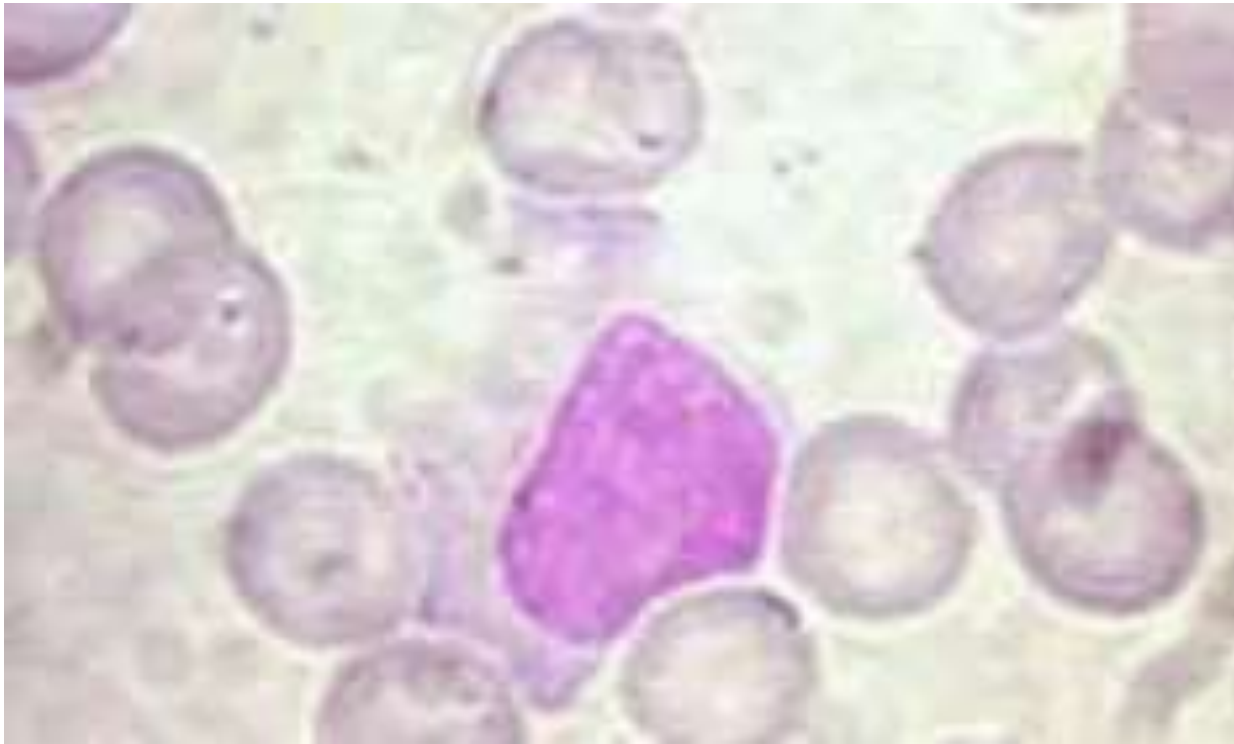
## Atypical Lymphocytes



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# EBV Infection

## Atypical Lymphocytes



# EBV Infection



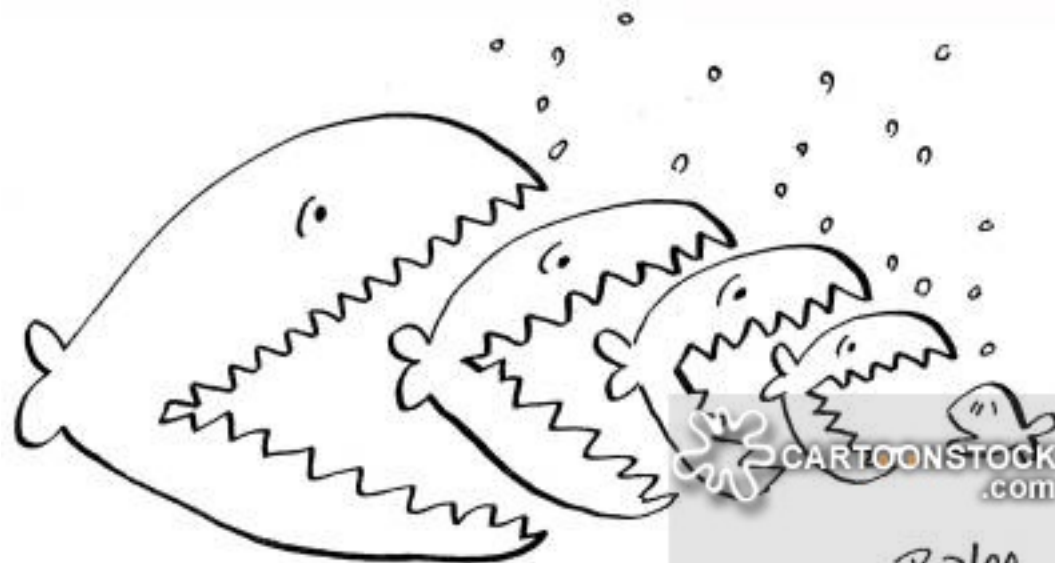
# Epstein-Barr Virus (EBV)

## **Treatment:**

**Treatment of infectious mononucleosis is largely supportive because more than 95% of the patients recover uneventfully without specific therapy**

## **Corticosteroids**





Baloo  
Search ID: rman5343

"I'm warning you guys —  
I've got herpes!"