AZERBAIJAN MEDICAL UNIVERSITY
DEPARTMENT OF MEDICAL MICROBIOLOGY and IMMUNOLOGY

LESSON 16.

Microbiology diagnosis of infections, caused by *Herpesviridae, Picornaviridae* families and *Rubivirus* genus

FACULTY: ***General Medicine***
SUBJECT: ***Medical microbiology - 2***

Discussed questions:

1. Herpesviridae family, general properties (classification, morphology, cultivation).
• Morpho-biological characteristics, epidemiology, diseases, pathogenesis, microbiological diagnosis, treatment and prevention of simple herpesviruses (SHV-I and SHV-II simple herpes viruses).
• Chicken pox - shingles virus (Varicella-zoster virus), morpho-biological characteristics, epidemiology, diseases caused by it, pathogenesis, microbiological diagnosis, treatment and specific prevention.
• Epstein-Barr virus, morpho-biological characteristics, epidemiology, pathogenesis and microbiological diagnosis of infectious mononucleosis
• Cytomegalovirus, morpho-biological characteristics, epidemiology, pathogenesis, microbiological diagnosis and treatment of diseases caused by it
• Other human herpesviruses (HIV-6, IHV-7, IHV-8)
2. Picornaviridae family, general properties (classification, morphology, cultivation, antigens, resistance).
• Morpho-biological characteristics of poliomyelitis viruses, epidemiology, pathogenesis, microbiological diagnosis, treatment and specific prevention of poliomyelitis.
• Morpho-biological characteristics, epidemiology, diseases caused by Coxsackie and ECHO viruses, pathogenesis, microbiological diagnosis, treatment
3.Rubivirus genus - Rubella virus, general, cultural properties, pathogenicity, epidemiology and pathogenesis of rubella, teratogenic effects of rubella virus. Microbiological diagnosis, treatment and specific prevention of measles

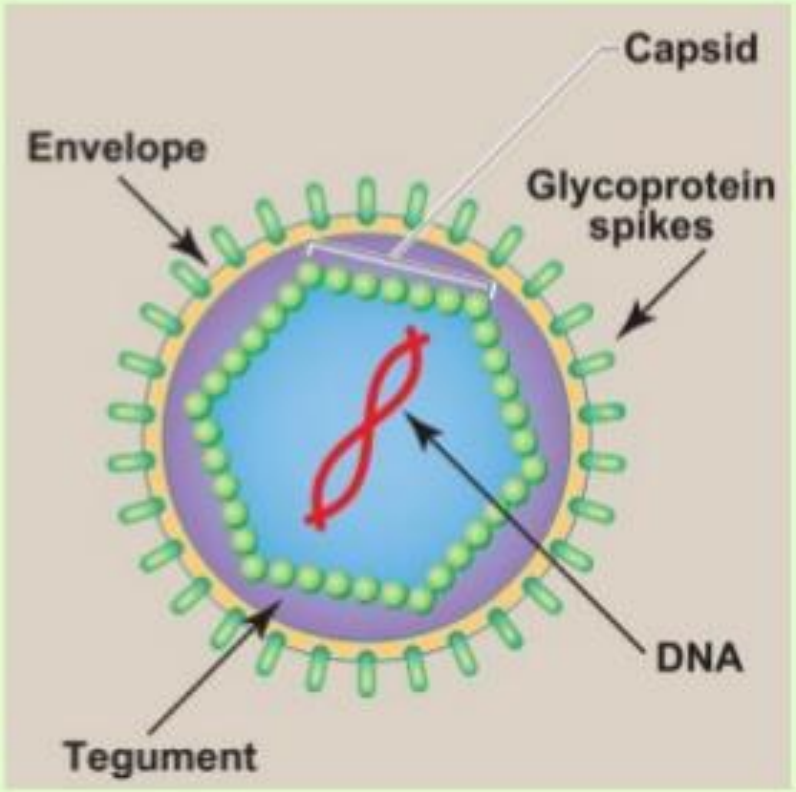
Purpose of the lesson:

- To acquaint students with the morpho-biological characteristics of viruses belonging to the family Herpesviridae, Picornaviridae (poliomyelitis, Coxsackie, ECHO) and Rubivirus (rubella), to teach them the methods of laboratory diagnosis of poliomyelitis, rubella and herpesvirus infections.

Herpes viruses

Introduction

- It's a kind of enveloped DNA virus.
- **Icosahedral** core surrounded by a lipoprotein **envelope.**
- linear double-stranded DNA.
- Large (120–200 nm in diameter), second in size only to poxviruses.
- Capsid surrounds DNA core and over the capsid is tegument (a protein-filled region).
- Nuclear membrane derived lipid bilayer containing viral glycoproteins

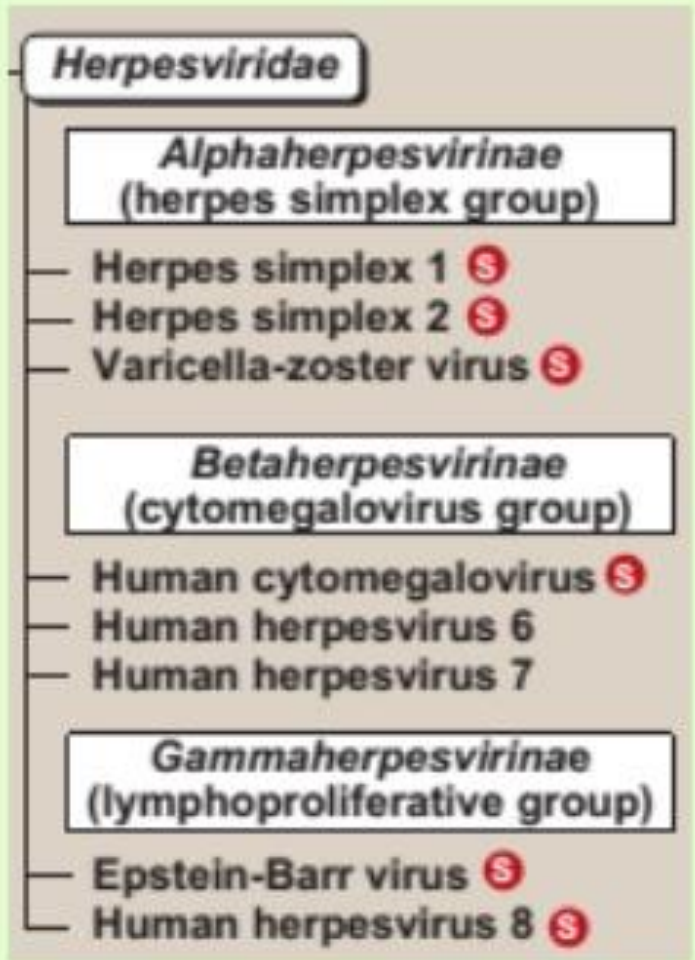


Classification

- Eight human herpesvirus species are known.
  - **Herpes Simplex Virus type 1 (HSV-1)**
  - **Herpes Simplex Virus type 2 (HSV-2)**
  - **Varicella-Zoster Virus (VZV)**
  - **Cytomegalovirus (CMV)**
  - **Epstein-Barr Virus (EBV)**
  - **Human Herpes Virus type 6 (HHV-6)**
  - **Human Herpes Virus type 7 (HHV-7)**
  - **Human Herpes Virus type 8 (HHV-8)**

Classification

- Its also classified on the basis of on biologic characteristics:
  - **Alphaherpesvirinae (herpes simplex virus group)**
  - **Betaherpesvirinae (cytomegalovirus group)**
  - **Gammaherpesvirinae (lymphoproliferative group)**



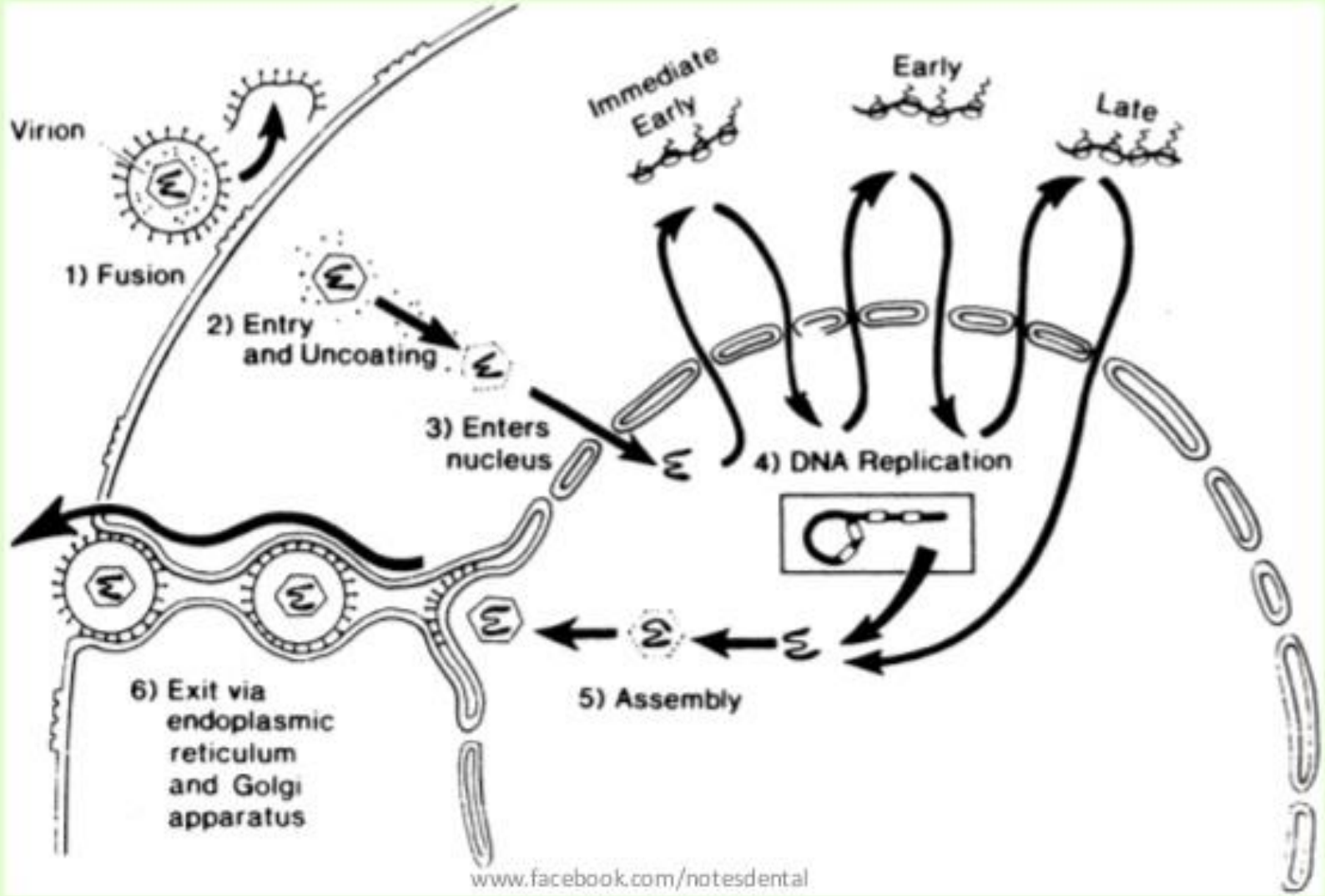
Herpes Simplex Viruses

- Herpes simplex virus **type 1 (HSV-1)** and **type 2 (HSV-2)** are distinguished by two main criteria
  - Antigenicity
  - location of lesions.
- HSV-1: **above the waist,** primarily in adults
  - Acute gingivostomatitis,
  - Recurrent herpes labialis (cold sores),
  - Keratoconjunctivitis (keratitis),
  - Encephalitis
- HSV-2: **below the waist**
  - herpes genitalis(genital herpes),
  - Neonatal encephalitis and other forms of neonatal herpes
  - Aseptic meningitis
- Humans are the natural hosts of both.

HSV - Replication

- DNA released in the cytoplasm
- DNA migrates to the nucleus
- mRNA (transcription) synthesis takes place in the nucleus by using host RNA polymerase
- mRNA transported to the cytoplasm
- New viral proteins made and migrate to nucleus
- Genomic DNA (replication) synthesis takes place in the nucleus by using viral DNA polymerase

HSV - Replication



Transmission

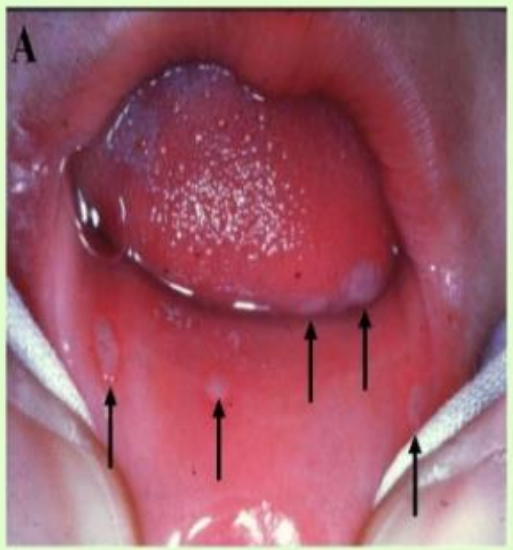
- HSV 1: transmitted primarily in **saliva.**
- **HSV 2:** transmitted by **sexual contact**
- **Oral–genital sexual** activity: HSV-1 infections of the genitals and HSV-2 lesions in the oral cavity.
  - 10–20% of cases
- HSV-2 infections has markedly increase comparatively.

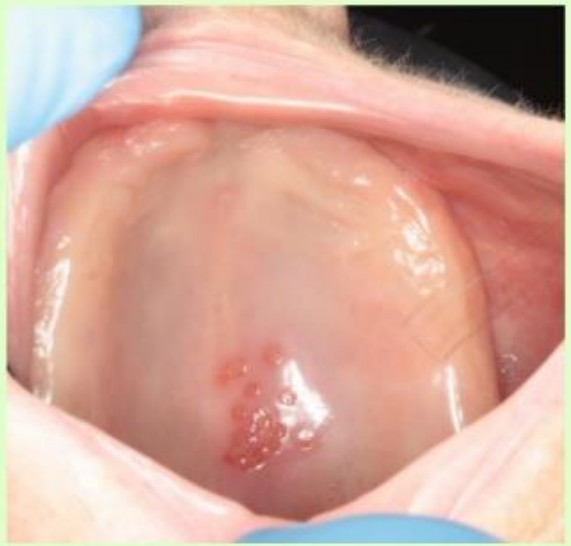
Clinical Findings: HSV-1

- causes several forms of primary and recurrent disease.
- **Gingivostomatitis**
  - Occurs primarily in children andis characterized by fever, irritability, and vesicular lesions in the mouth.
  - The primary disease is more severe and lasts longer than recurrences.
  - The lesions heal spontaneously in 2 to 3 weeks.
  - Many children have asymptomatic primary infections
- **Herpes labialis**
  - fever blisters or cold sores is the milder, recurrent form
  - characterized by crops of vesicles, usually at the mucocutaneous junction of the lips or nose
  - Recurrences frequently reappear at the same site.

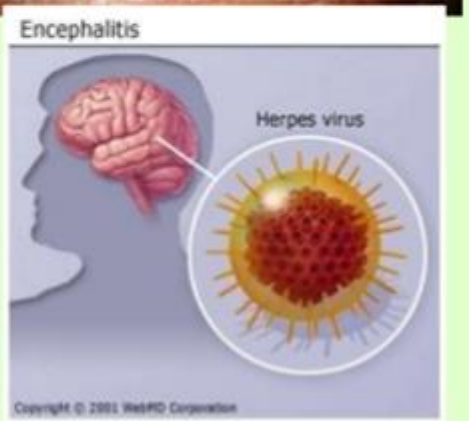
Clinical Findings: HSV-1

Gingivostomatitis





- **Keratoconjunctivitis**
  - characterized by corneal ulcers and lesions of the conjunctival epithelium.
  - Recurrences can lead to scarring and blindness
- **Encephalitis**
  - necrotic lesion in one temporal lobe.
  - Fever, headache, vomiting, seizures, and altered mental status

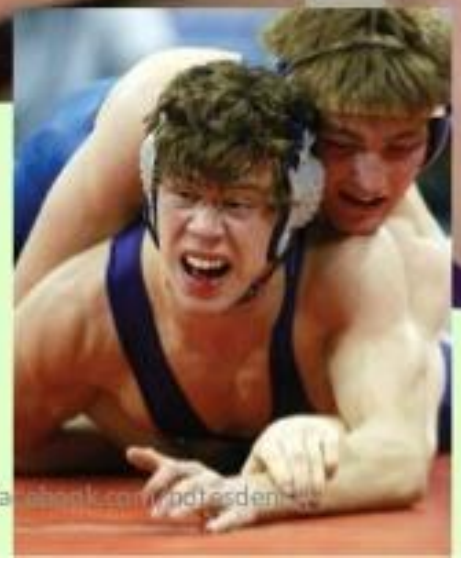


Clinical Findings: HSV-1

- **Herpetic whitlow**
  - pustular lesion of the skin of the finger or hand.
  - It can occur in medical personnel as a result of contact with patient's lesions.
- **Herpes gladiatorum**
  - wrestlers and others who have close body contact.
  - vesicular lesions on the head, neck, and trunk.
- **Disseminated infections,**
  - such as esophagitis and pneumonia,
  - occur in immunocompromised patients with depressed T-cell function.

Clinical Findings: HSV-1

Herpetic whitlow



Herpes gladiatorum

Clinical Findings: HSV-2

- **Genital herpes**
  - painful vesicular lesions of the male and female genitals and anal area
  - The lesions are more severe and protracted in primary disease than in recurrences.
  - Primary infections are associated with fever and inguinal adenopathy.
  - Asymptomatic infections - source of infection of other individuals
    - Men: prostate or urethra
    - Women: cervix

Clinical Findings: HSV-2

- **Neonatal herpes**
  - originates chiefly from contact with vesicular lesions within the birth canal.
  - varies from severe disease (e.g., disseminated lesions or encephalitis) to milder local lesions (skin, eye, mouth) to asymptomatic infection.
  - prevented by performing cesarean section on women with either active lesions or positive viral cultures.
  - neither HSV-1 nor HSV-2 causes congenital abnormalities to any significant degree.

Laboratory Diagnosis

- Isolation of the virus from the lesion by growth in cell culture
  - typical cytopathic effect occurs in 1 to 3 days,
  - identified by **fluorescent antibody staining** of the infected cells or ELISAs
- **Tzanck smear**: rapid diagnosis
  - Giemsa stain: Multinucleated Giant Cell presence in vesicles
- Serologic tests such as the neutralization test

Treatment

- **Acyclovir :** treatment of choice
  - **shortens the duration** of the lesions
  - **reduces the extent of shedding** of the virus
- **Penciclovir** (a derivative of acyclovir) or **docosanol:** recurrences of orolabial HSV-1
- **Valacyclovir and famciclovir**: genital herpes and in the suppression of recurrences.

Prevention

- avoiding contact with the vesicular lesion or ulcer.
- Cesarean section is recommended for women who are at term and who have genital lesions or positive viral cultures.

Varicella-Zoster Virus (VZV)

- Clinical chicken pox (primary infection)
- 90% of cases before age 10, peak incidence 2-8 years
- Virus entry through inhalation
- Replicates in respiratory tract and invades lymph nodes.
- Viremia: spreads virus to target organs
- Incubation period 14-18 days

VZV - Chicken Pox

- Rash appears first on head, neck, trunk
- Vesicles contain clear fluid (itch)
- New vesicles appear during first week
- Mild fever, malaise, headache
- Recovery in 2 weeks
- Adult infections more severe (pneumonia)
- Neonatal infection (encephalitis) Immunosuppressed (severe progressive infection)

VZV - Chicken Pox

VZV - Chicken Pox

VZV - Shingles

- Shingles: reactivation of varicella-zoster
- DNA remains latent in ganglia
- Occurrence increases with age (50% over 50 yrs)
- Onset of pain occurs before appearance of vesicles
- Usually unilateral
- Immunosuppressed patients especially vulnerable

VZV - Shingles

VZV - Diagnosis and Treatment

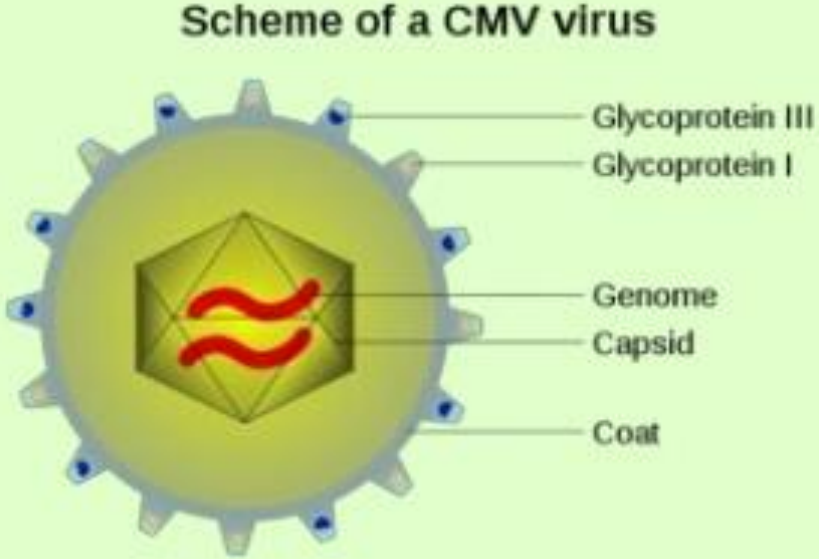
- **Diagnosis**
  - Clinical picture (almost always)
  - Immunofluorescent antibody staining biopsy
- **Treatment**
  - Supportive
  - acyclovir for extreme case

Chicken Pox - Prevention

- **Prevention**
  - immune globulin for patients at risk
  - *Vaccine:* live vaccine (VARIVAX, Merck & Co.)
  - *Recommended dose*
    - For susceptible children aged 12 months to 12 years is one 0.5 ml dose subcutaneously
    - For susceptible adolescents aged 13 years and adults is two 0.5 ml doses 4 to 8 weeks apart

Cytomegalovirus (CMV)

- ds DNA virus
- largest genome of the herpes virus group
- similar to HSV but highly regulated by cis-acting elements and regulatory proteins-slow replication and slow disease effects
- Nuclear and cytoplasmic inclusion bodies, induction of giant cells



CMV - Clinical Features

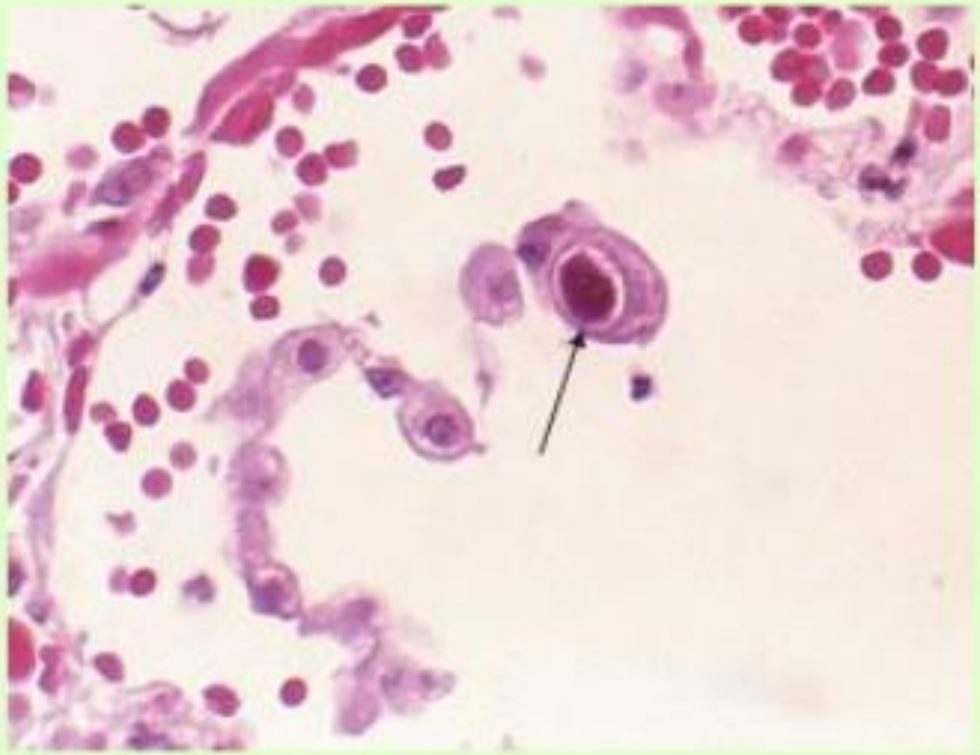
- **Transmission:** close contact, sexually transmitted, virus can be recovered from all body fluids much as saliva, urine, semen, & cervical secretions
- **Clinical features**
  - high infection rates in early childhood and early adulthood
  - usually asymptomatic
  - Systemic CMV infection; pneumonia and hepatitis in immunosuppressed patients (transplant patients)
  - In AIDS patient; diarrhea, retinitis

CMV - Clinical Features

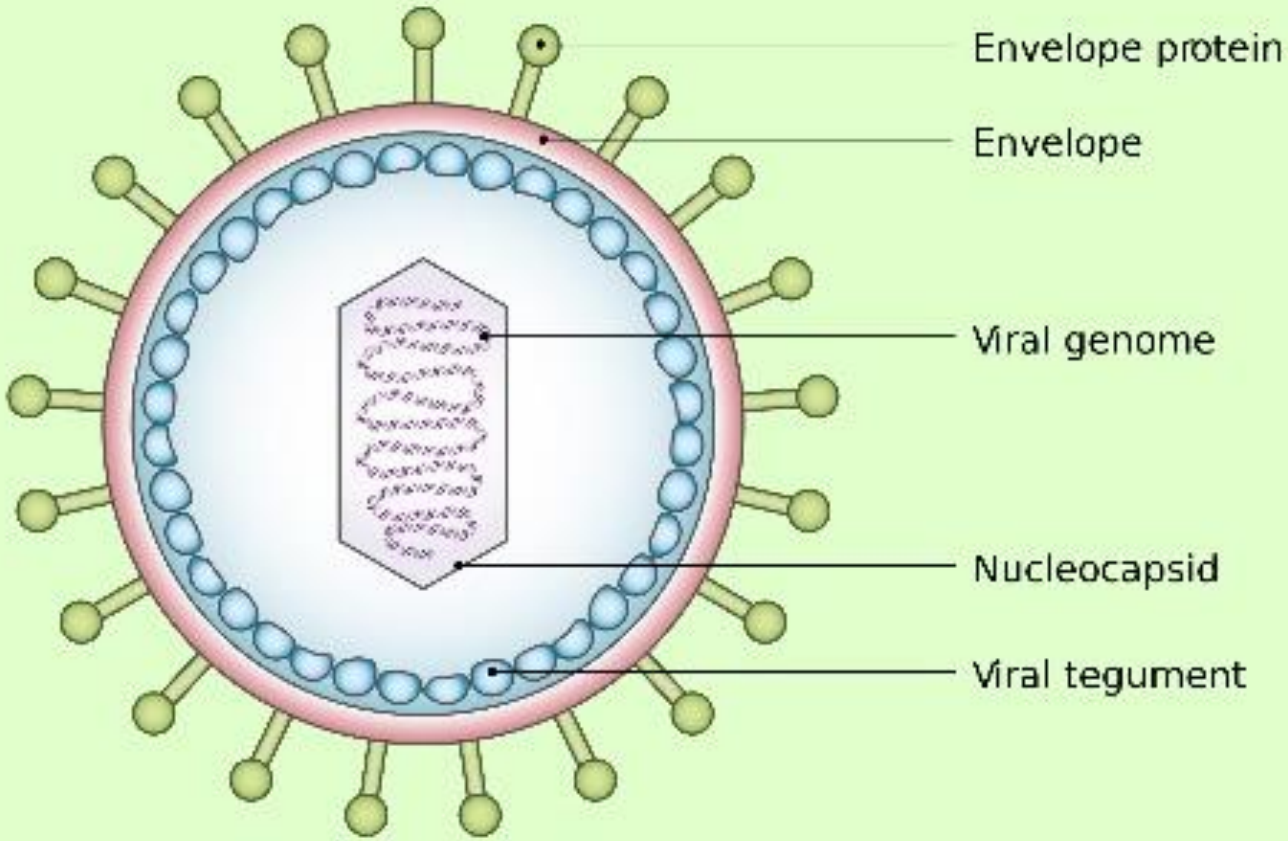
- **Congenital CMV**
  - most infants appear normal at birth
  - may develop hearing loss or some mental retardation often later.
  - Infants with symptomatic illness at birth demonstrate hepatosplenomegaly, jaundice, anemia, low weight, microcephaly, rash, thrombocytopenia
  - Neonatal – asymptomatic
  - Immunosuppressed: CMV pneumonia, disseminated CMV
  - CMV retinitis

CMV - Diagnosis and Treatment

- **Diagnosis**
  - isolation of virus, electron microscopy, serology,
  - DNA amplification by PCR
- **Treatment**
  - hyperimmune globulin, ganciclovir



Epstein-Barr Virus (EBV)

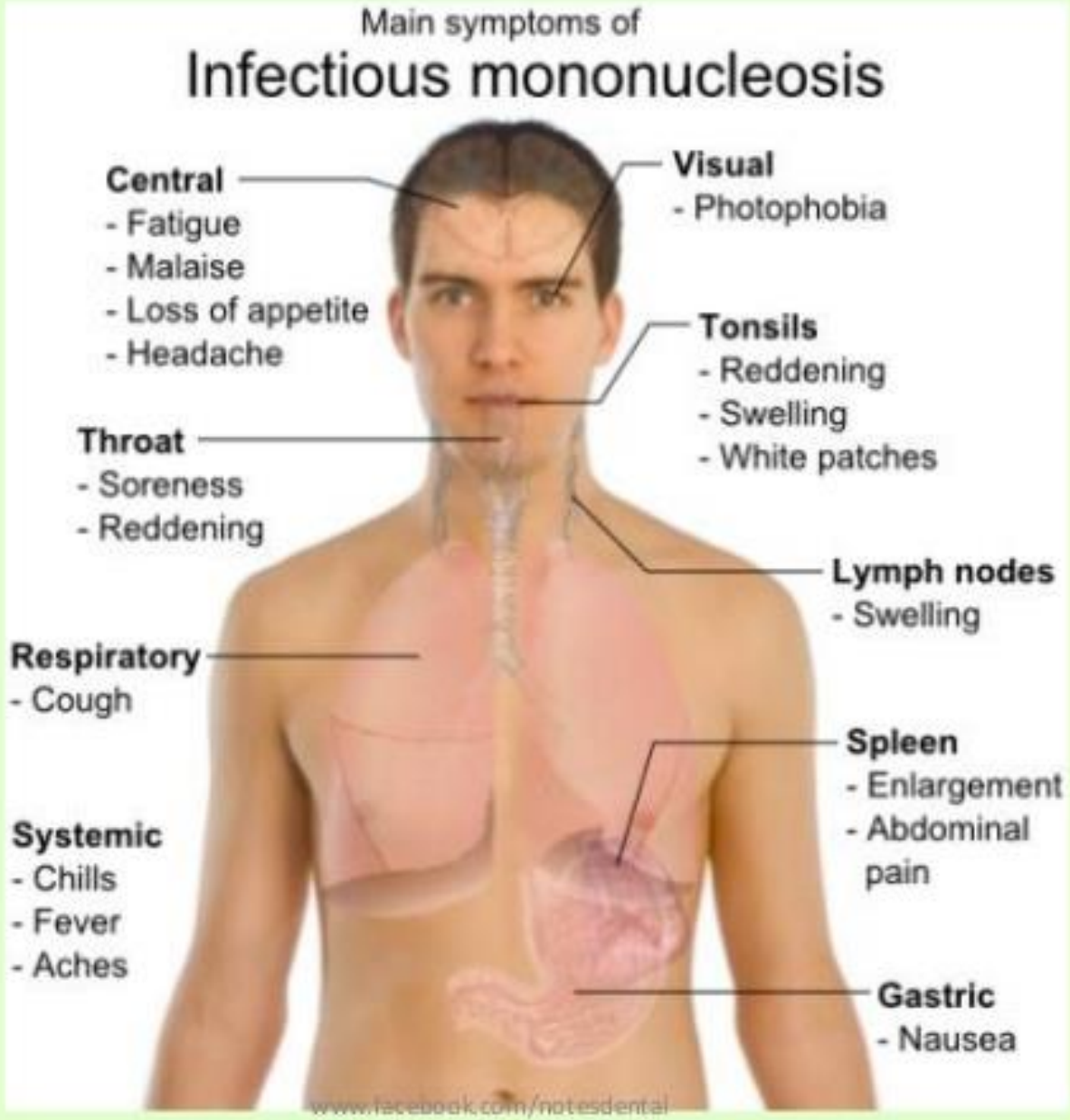


Epstein-Barr Virus (EBV)

- **Structure:** DNA virus, enveloped
- Etiologic agent of infectious mononucleosis and African Burkitt's Lymphomas.
- Recent study has linked with Hodgkins lymphoma
- Cultured in only lymphoblastoid cell lines derived from B lymphocytes of humans and higher primates
- Viral genome can be cultivated continuously and are transformed or immortalized.

Epstein-Barr Virus (EBV)

- EBV nuclear antigens (EBNAs) appear in the nucleus prior to virus directed protein synthesis.
- Viral capsid antigen (VCA) is detected in virus producing cell lines
- EBV can be cultured from saliva and thus infection is acquired by contact.
- **Transmission**
  - contact with infected secretions,
  - low contagiousness,
  - virus can be cultured from throat washings


Main symptoms of
Infectious mononucleosis
Central
- Fatigue
- Malaise
- Loss of appetite
- Headache
Visual
- Photophobia
Tonsils
- Reddening
- Swelling
- White patches
Throat
- Soreness
- Reddening
Lymph nodes
- Swelling
Respiratory
- Cough
Spleen
- Enlargement
- Abdominal pain
Systemic
- Chills
- Fever
- Aches
Gastric
- Nausea
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EBV: Clinical Features

- Infectious mononucleosis, usually asymptomatic
- If symptoms persist (young adults)
  - low fever
  - headache,
  - sore throat,
  - fatigue,
  - night chills (sweats),
  - enlarged lymph nodes and spleen,
  - elevated lymphocytes and monocytes and atypical lymphocytes
- **Complications**
  - laryngeal obstruction, meningitis,
  - encephalitis, hemolytic anemia,
  - thrombocytopenia or splenic rupture may occur in 1 to 5% of the patients

BURKITT'S LYMPHOMA

Hairy leukoplakia : Strong Association with EBV

EBV - Diagnosis

- Clinical picture
- Complete Blood Cell Count – Atypical lymphocytes
- **Serology**
  - Expensive
  - Demonstrate antibody to viral capsid antigen (VCA) which rises quickly and persists for life.
  - Antibodies to EBNAs rise later and decrease in about 1 month

EBV - Diagnosis

- **Serology**
  - A high titer of VCA and no titer of EBNA suggest recent infection
  - Antibodies to early antigen (EA) may be useful in correlating with nasopharyngeal CA and African Burkitt's lymphomas
- **Culture**
  - Usually positive in acute illness,
  - but asymptomatic viral shedding is so common, that culture is seldom helpful.

EBV - Epidemiology and Treatment

- **Epidemiology**
  - Burkitt's lymphoma- Central & East Africa
  - Tumor in jaw area: Nasopharyngeal carcinoma: China & Southeast Asia
- **Treatment and Prevention**
  - Supportive
  - Acyclovir can suppress the replication process
  - No vaccine available

Human Herpes Virus - 6

- HHV-6 detected in patients with lymphoproliferative diseases.
- Genetically distinct but morphologically similar to other herpes virus.
- Replicates in lymphoid tissue preferentially in T lymphocytes.
- Cytopathic for T lymphocytes in cell culture.
- Establishes a latent infection and may be activated by mitogenic stimulation.

HHV-6 - Clinical Features

- Serologic studies indicate that almost all children are infected by age 5.
- Most communicable of all herpes virus.
- Spread by close personal contact or by respiratory route.
- **Disease**: Roseola infantum (rash like disease)
- Reacativated in transplant patients
- **Treatment**: Acyclovir is 15 to 30% absorbed by oral route

Human Herpes Virus -7

- HHV-7 discovered in 1990
- Isolated from activated CD4+ T lymphocytes.
- HHV-7 is distinct from all other known human herpesviruses but closely related to HHV-6.
- Infects most children by age 2 and 97% of adults are seropositive
- Culture restricted to specialized virology lab.
- Diagnosis of acute infection by seroconversion.

Human Herpes Virus - 8

- HHV-8, Kaposi's sarcoma-associated herpesvirus, KSHV
- Discovered as herpesvirus sequences in AIDS related Kaposi’s sarcoma (KS) patients
- HHV-8 DNA sequences found in 95% of KS tissues, both AIDS and non-AIDS related cases
- KSHV DNA has also been detected in cells from lymphoproliferative diseases

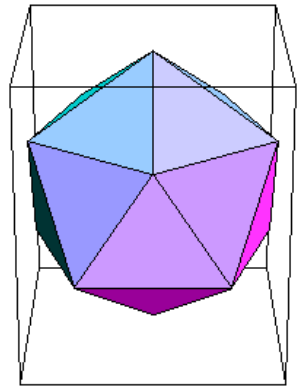
Kaposi's sarcoma

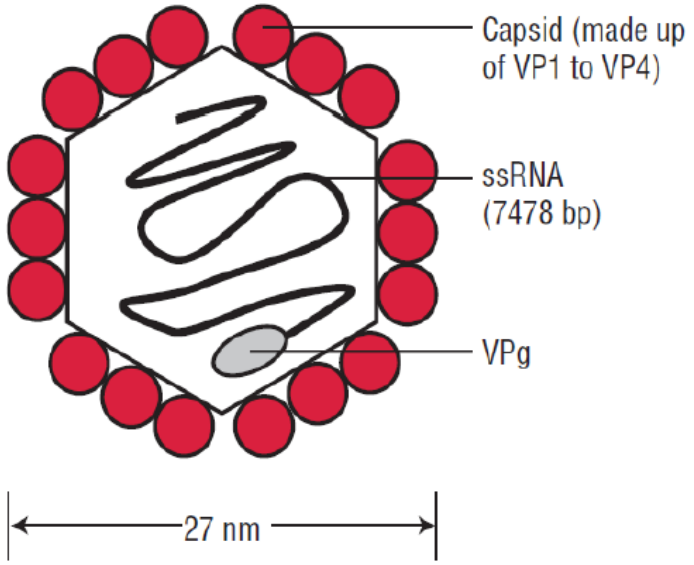
two raised reddish purple lesions on the foot caused by human herpesvirus-8

Kaposi's sarcoma

Picornaviridae family

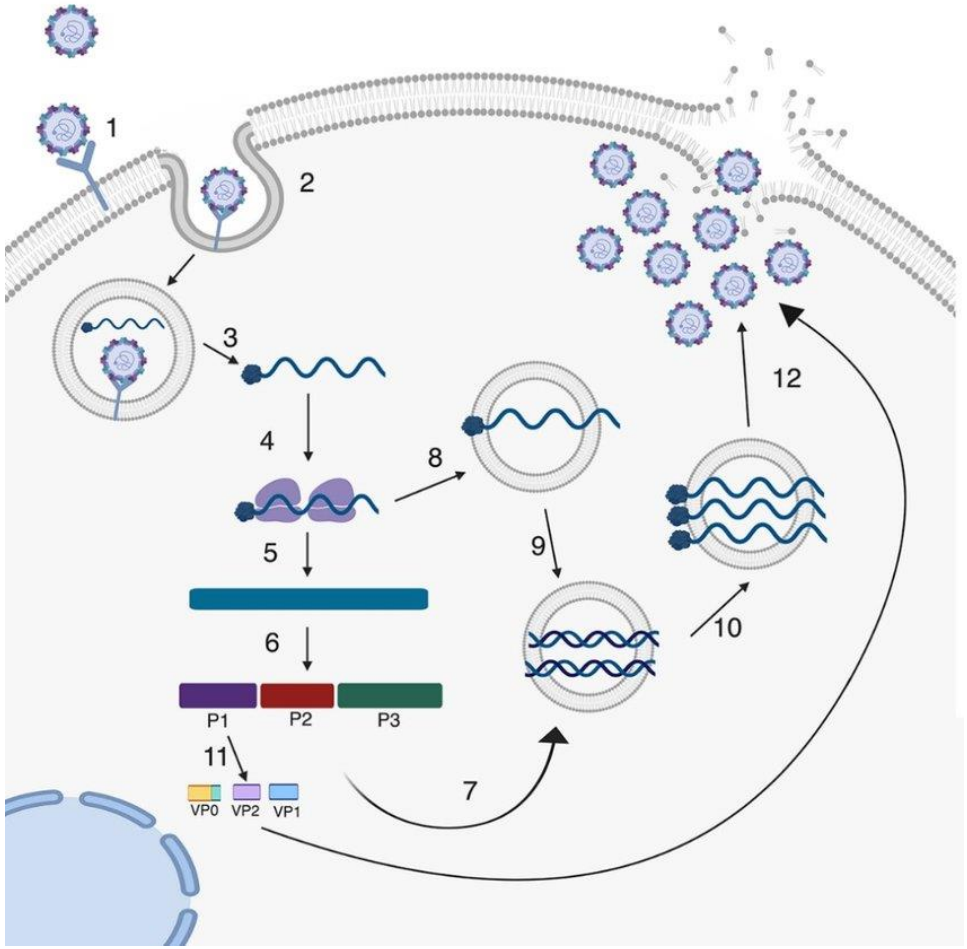
- Members of the Picornaviridae family are non-enveloped viruses with single-stranded RNA. The name of the section is related to the very small size of these viruses (pico-small, rna-RNA).
- They are viruses with a simple structure (without a membrane), 28-30 nm in size.
- The capsid has 12 pentomers with icosahedral symmetry. On the surface of each pentomer there are special grooves ("canyons") that ensure the connection of the virus with the host cell, as well as with the Fab-fragments of antibodies.
- The genome of viruses consists of positive RNA of infectious nature and VPg-protein combined with it.





Reproduction of picornaviruses

- Reproduction occurs in the cytoplasm of host cells.
- The virus enters the host cell by endocytosis.
- Genome RNA plays the role of information-RNA and participates in the synthesis of viral proteins, including RNA-dependent RNA-polymerase.
- This enzyme synthesizes negative-RNA over positive-RNA, and again positive-RNA (genomic RNA) over it.
- The genome-RNA is surrounded by a capsid made of structural proteins and forms the mature virion.
- As a result of cell lysis, virions are released.



Classification of picornaviruses:

- The Picornaviridae family consists of 9 genera: *Enterovirus* (enteroviruses), *Hepatovirus* (hepatitis A virus), *Rhinovirus* (rhinoviruses), *Aphtovirus* (skin virus), *Parechovirus* (parechoviruses), *Cardiovirus*, etc. consists of. The first 5 genera are more important in human pathology.

ENTEROVIRUSES

- Enteroviruses are a genus of the picornavirus family which replicate mainly in the gut.
- Single stranded naked RNA virus with icosahedral symmetry.
- Unlike rhinoviruses, they are stable in acid pH.
- Capsid has 60 copies each of 4 proteins, VP1, VP2, VP3 and VP4 arranged with icosahedral symmetry around a positive sense genome.

ENTEROVIRUSES

- At least 71 serotypes are known: divided into 5 groups
  - Polioviruses
  - Coxsackie A viruses
  - Coxsackie B viruses
  - Echoviruses
  - Enteroviruses (more recently, new enteroviruses subtype have been allocated sequential numbers (68-71))

CATAGORIES OF ENTEROVIRUSES

VIRUS	SEROTYPES	CLINICAL DISEASES
Polioviruses	3 types	Asymptomatic infection, viral meningitis, paralytic disease, poliomyelitis
Coxsackie A viruses	23 types (A1-A22, A24)	Viral meningitis plus, rash, ARD, myocarditis, orchitis
Coxsackie B viruses	6 types (B1-B6)	Viral meningitis, but no orchitis
Echoviruses	32 types	Viral meningitis, with orchitis
Other Enteroviruses	4 types(68-71)	Viral meningitis

PROPERTIES OF ENTEROVIRUSES

PROPERTY	ENTEROVIRUSES
Size (nm)	22 – 30
Capsid Form	Icosahedral
Polypeptide	VP1, VP2, VP3, VP4
RNA Type	SS – PS
RNA Molecular Weight	2000,000 – 2600,000
Acid	Stable
Optimal Temp.for growth (^{0} C)	37^0 C
Density in Cesium chloride (g / m)	1 . 34

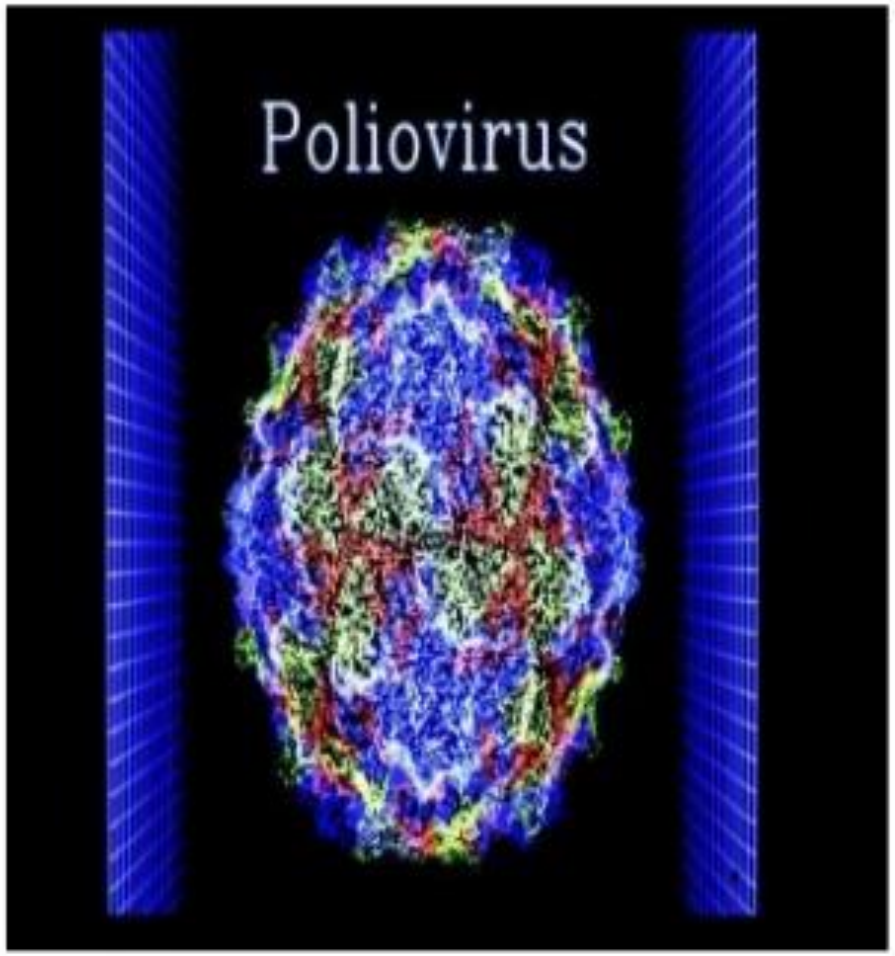
TRANSMISSION OF ENTEROVIRUSES

- Fecal – oral route: poor hygiene, dirty diapers(especially in day-care settings)
- Ingestion via contaminated food and water
- Contact with infected hands
- Inhalation of infectious aerosols

POLIO – AN ENTEROVIRUS

- Poliovirus, the causative agent of poliomyelitis, is a human enterovirus and member of the family of Picornaviridae. Poliovirus is composed of a RNA genome and a protein capsid. The genome is single-stranded positive-sense RNA genome that is about 7500 nucleotides long. The viral particle is about 300 Angstrom in diameter with icosahedral symmetry.

CLASSIFICATION OF POLIOVIRUS



- Size is 27 nm
- Contains 4 viral protein VP1 to VP 4
- VP1 Carries the major antigenic site, and combines with type specific neutralizing antibodies

PROPERTIES OF POLIOVIRUS

- Typical Entero virus.
- Inactivated at 55^0 c for 30 mt.
- Chlorine at 0.1 ppm
- Ether is not effective.
- Animal susceptibility.

  Monkey brain

  Requires Primate specific membranes.

  Contains 3 Antigenic types 1,2,3

Can be differentiated by ELISA and CF methods.

POLIOMYELITIS

- Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted through contaminated food and water, and multiplies in the intestine, from where it can invade the nervous system.

DWD

POLIOMYELITIS

- Polio = gray matter, Myelitis = Inflammation of the spinal cord.
- Involves CNS, produces serious Illness.
- Causes Destruction of Motor Neurons in Spinal cord.
- Produces FLACID PARALYSIS.
- India has still has many cases of Poliomyelitis.

EPIDEMIOLOGY

- Endemic
- Epidemic
- Hygiene plays in spread of diseases.
- Children < 5 in Developing countries.

POLIO INFECTION

- Incubation 3 – 21 days
- On average 14 days
- Predisposing factors.

  Severe muscular activity can lead to paralysis, as it increases the blood flow

  May produce paralysis in the limb or bulbar region

  Injecting vaccines with adjuvant can predispose to paralysis

  Patients who underwent tonsillectomy have higher incidence as Ig G secretion is reduced

  Rarely oral Polio vaccine produces poliomyelitis.

PATHOLOGY & PATHOGENESIS

- Destroy the Anterior horn cells of the Spinal Cord
- Do not Multiply in Muscles only muscles manifest with weakness and flaccid paralysis result is secondary.
- Occasionally produce
  - Myocarditis,
  - Lymphatic hyperplasia.

PATHOLOGY & PATHOGENESIS

- Enter through Mouth,
- Multiplies in Oropharynx tonsils and Intestines,
- Excreted in Stool.
- Enters the CNS from Blood.
- Spread along the Axons of peripheral nerves to CNS.
- Progress along the fibers of the lower motor neurons spinal cord or brain.

VIRUS INFECTION PROCESS

- The polio virus infects human cells by binding to an immunoglobulin-like receptor called CD155 (poliovirus receptor).
- The exact mechanism that poliovirus uses for entering the cell is unknown. However, the interaction of poliovirus and CD155 causes a change in the shape of the viral particle that is needed to enter the cell
- There are two thesis' for the way the viral nucleic acid to enters the cell. The first thesis is that the RNA of poliovirus is injected into the host cell through a pore in the membrane of the host cell. The second, and the one that is most likely and has the most support through research, is that the poliovirus is taken in by the host cell through endocytosis.
- Poliovirus has ssRNA. Also known as single-strand RNA.

CLINICAL MANIFESTATIONS

- In apparent, Only 1% manifest with clinical features.
- Can lead to permanent paralysis.
- Incubation 7-14 days, (3-35)
- May be abortive Poliomyelitis,

Only Fever, Malaise, Drowsiness,

Non paralytic Poliomyelitis,

Aseptic Meningitis.

PARALYTIC POLIOMYELITIS

- Manifest as Flaccid Paralysis.
  (Caused due to damage to Lower Motor Neurons.)
- Partial recovery within 6 months.
- Patient may continue with life time disability
- Can involve Spinal cord, and Bulbo spinal region
- Bulb spinal involvement can paralyze respiratory muscle and lead to Respiratory failure

ASEPTIC MENINGITIS

- Present with Non paralytic form with stiffness and pain in the back and neck region
- Lasts for 2 -10 days
- Recovery rapid and complete
- On rare occasions advance to paralysis

LABORATORY DIAGNOSIS

- Viral isolation from
  - Throat swabs,
  - Rectal swabs.
  - Stool specimens,
- Transported in frozen containers.
- Produce cytopathic effect on
  - Human and Monkey cells
- Produce cytopathic effects.

VIRAL ISOLATION

- From feces - present in 80% of cases in 1st week
- In 50 % till 3rd week
- In 25 % till several weeks
- Collect the fecal sample at the earliest.
- Primary monkey kidney is the ideal cell line for isolation of virus
- Viral isolation must be interpreted with caution and clinical presentation

LABORATORY DIAGNOSIS (SEROLOGY)

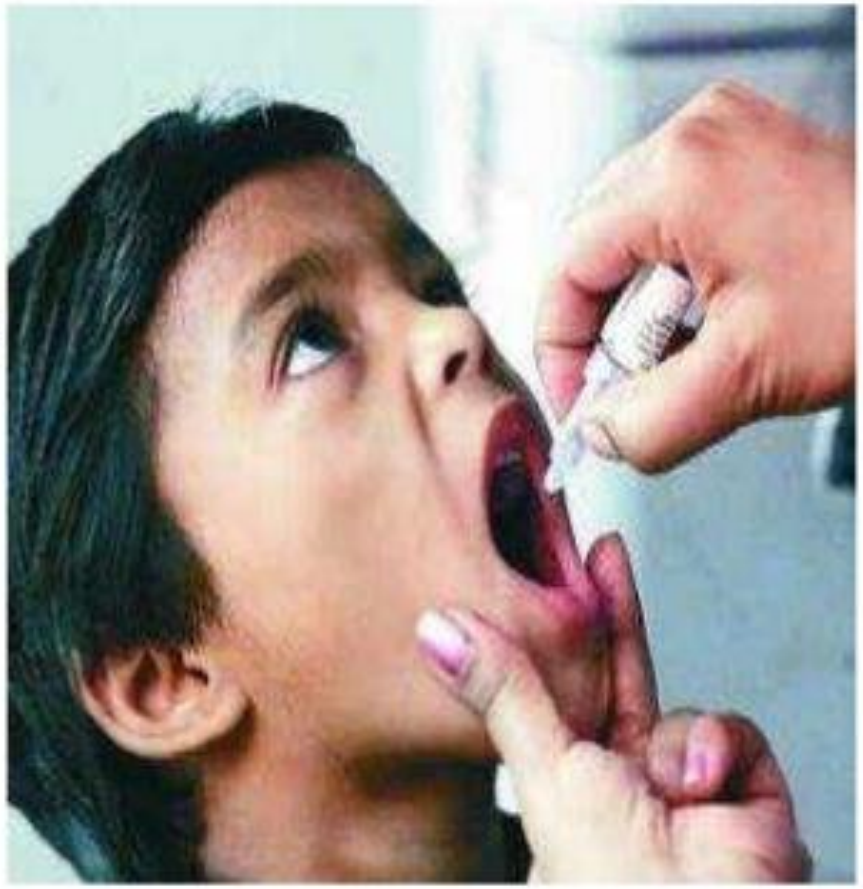
- Estimation of Antibodies IgM
- A paired sample is essential.
- ELISA
- CFT
- Neutralisation.

PREVENTION & CONTROL

- Sabin's Live attenuated vaccine
- Grown in Monkey kidney cells, Human Diploid cells. Preserved at 4^0 C
- Multiple doses are given
- Given as oral Drops
- At present only vaccine given in our National Programme of Immunization
- Boosts Immunity with Production IgG ,IgM
- And also IgA Participate as participant in Prevention.

ORAL POLIO VACCINE (SABIN'S)

- Highly effective in producing immunity to poliovirus
- 50% immune after 1 dose
- >95% immune after 3 doses
- Immunity probably lifelong



ADVANTAGES OF LIVE VACCINE

- Induces long lasting immunity.
- Induces local immunity in the form of IgA production (gut immunity).
- Administered orally, without the need of sterile syringes.

DISADVANTAGES OF LIVE VACCINE

- The only disadvantage of this vaccine is the vaccine strain particular type 3 strain can reverts to virulerence and cause paralysis in those who just been vaccinated.

- It is estimated that vaccine induced poliomyelitis is seen in rate of 1 in 3000,000 vaccinations.

INJECTABLE KILLED SALK VACCINE

- Salk Vaccine - A Killed Vaccine. (INACTIVATED)
- Four Injections are administered in a period of two years,
- Administration of periodic booster recommended.
- Most of the Western Nations do use it.

DISEASES ASSOCIATED WITH COXASKIE A VIRUS

- Febrile illness with maculopapular rash.
- Upper respiratory tract infection.
- Paralytic disease.
- Meningitis & encephalitis.
- Peri and myocarditis.
- Herpangina.
- Hand, foot & mouth disease.
- Acute hemorrhagic conjunctivitis.

DISEASES ASSOCIATED WITH COXASKIE A VIRUS

- Caused by group A Coxsackieviruses.
- Characterized by fever, sore throat, pain on swallowing .
- Small vesicles appear on the pharynx, Palate, uvula and tonsils .
- Recovery is usual .

HAND FOOT & MOUTH DISEASE

- Caused by group A coxsackie viruses .
- Small papules &vesicles develop on the buccal mucosa, hands and feet .
- Recovery is usual .

DISEASES ASSOCIATED WITH COXASKIE B VIRUS

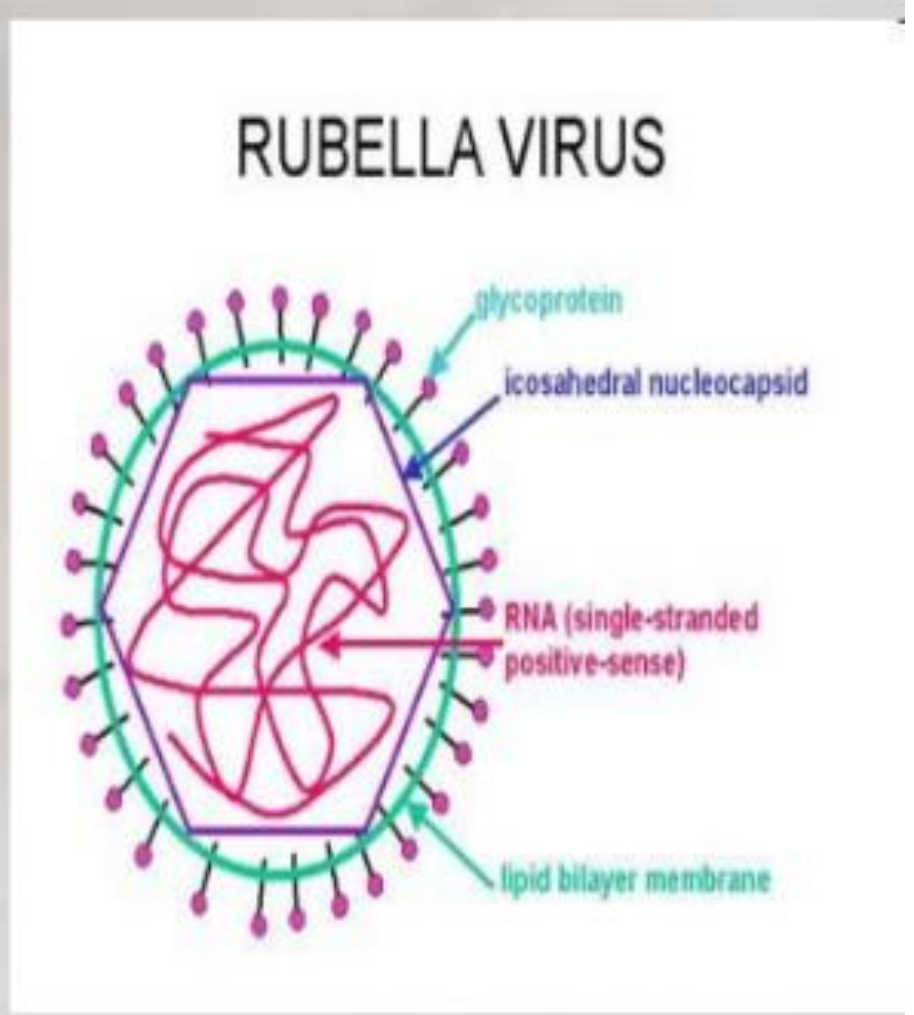
- Febrile illness with maculopapular rash.
- Upper respiratory tract infection.
- Paralytic disease.
- Meningitis & encephalitis.
- Peri & myocarditis.
- Pleurodynia.
- Juvenile diabetes/ pancreatitis .

DISEASES ASSOCIATED WITH ECHO VIRUS

- Febrile illness with maculopapular rash.
- Upper respiratory tract infection.
- Paralytic disease.
- Meningitis & encephalitis.
- Peri & myocarditis.

RUBELLA VIRUS

- Rubella virus is single stranded RNA virus
- Diameter 50 – 70 nm
- Enveloped Spherical
- Virus multiply in the cytoplasm of infected cell



Classification

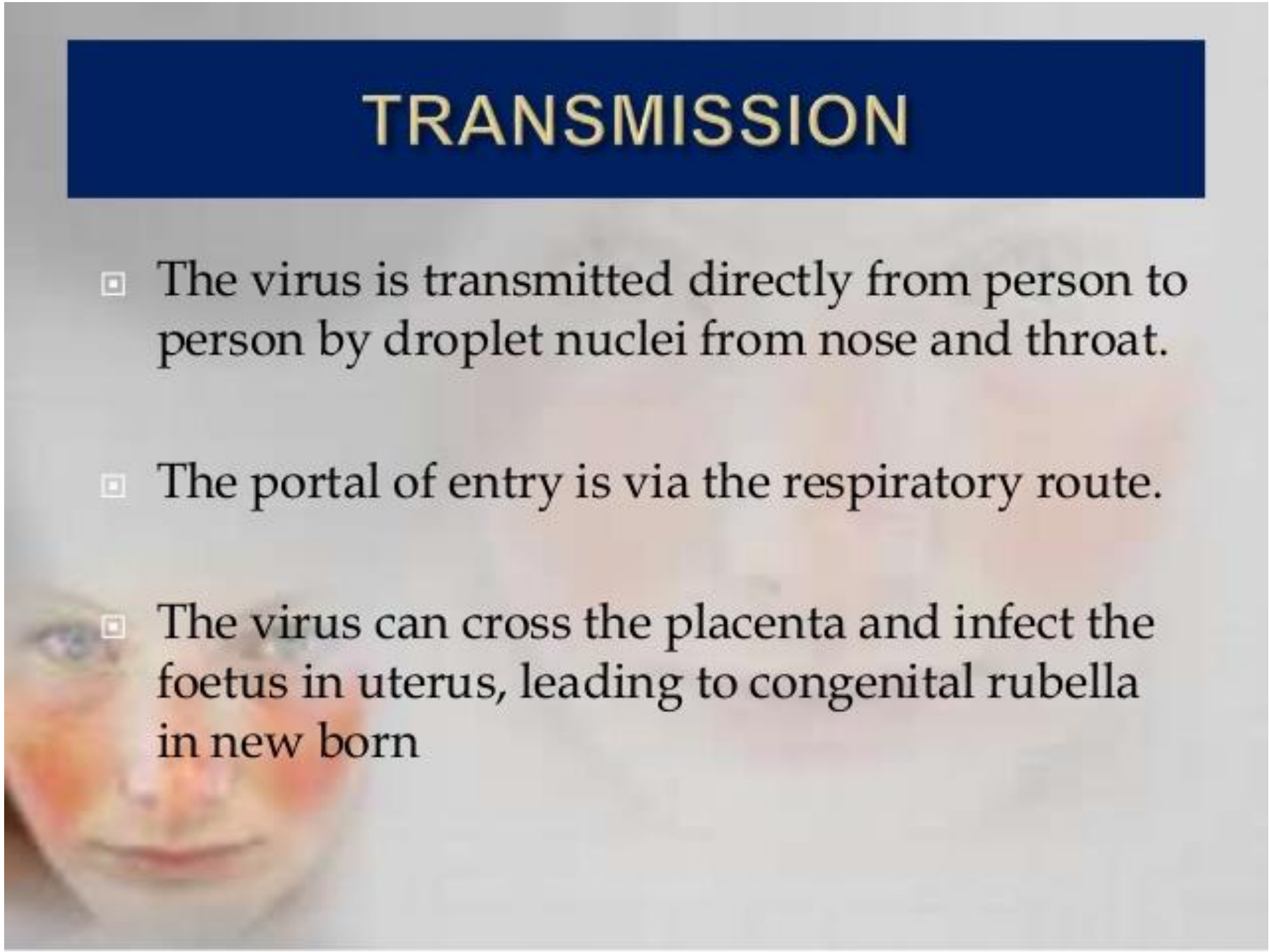
- Family : Togaviridae
- Genus : Rubivirus
- Species : Rubella virus

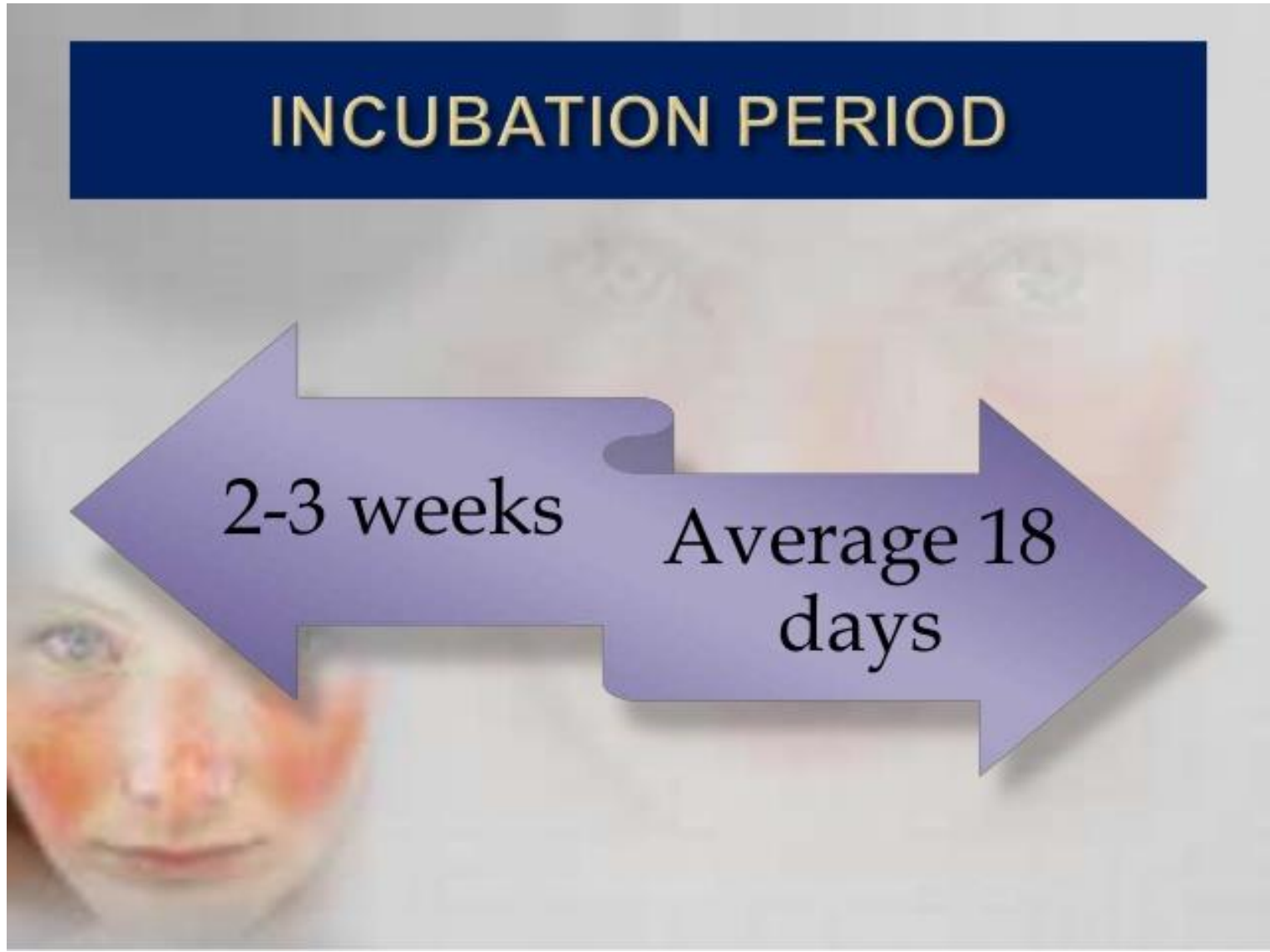
INTRODUCTION

- **Rubella,** commonly known as **German measles**, is a disease caused by Rubella virus. The name is derived from the Latin, meaning ***little red.***
- Rubella is also known as German measles because the disease was first described by German physicians, Friedrich Hoffmann, in the mid-eighteenth century.

TRANSMISSION

- The virus is transmitted directly from person to person by droplet nuclei from nose and throat.
- The portal of entry is via the respiratory route.
- The virus can cross the placenta and infect the foetus in uterus, leading to congenital rubella in new born




INCUBATION PERIOD
2-3 weeks
Average 18 days

Main Symptoms of Rubella

- the primary symptom of rubella virus infection is a **red-pink rash**

- the rash usually starts
  - ✓ behind the ears, then around the head and neck
  - ✓ it may then spread to the chest and tummy, legs and arms

- secondary symptoms are **swollen lymph nodes**

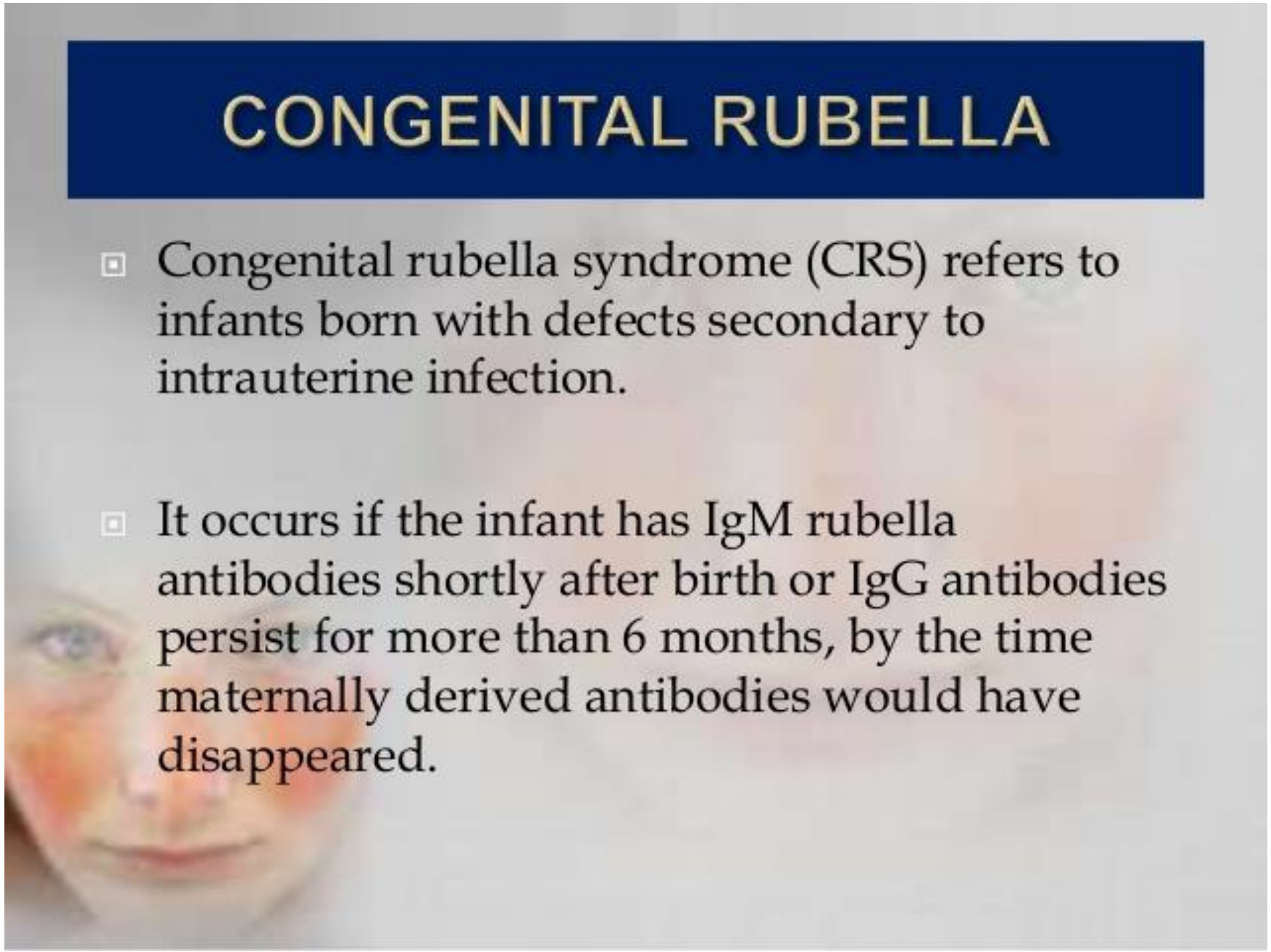
RUBELLA DURING PREGNANCY

- "Rubella infection in pregnant women during the first three months of pregnancy may result in the baby being born with birth defects or congenital rubella syndrome.

CONGENITAL RUBELLA

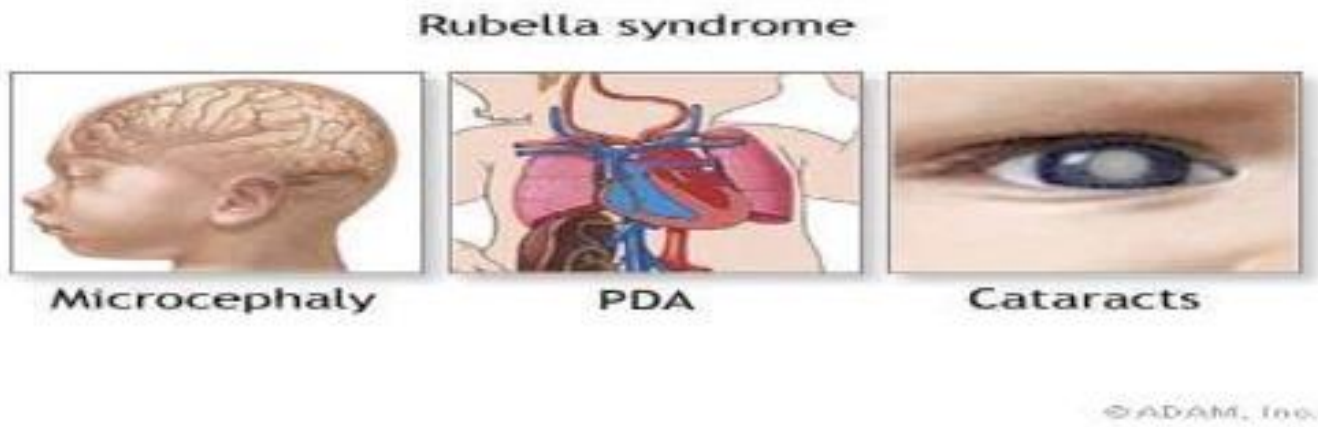
- Congenital rubella syndrome (CRS) refers to infants born with defects secondary to intrauterine infection.

- It occurs if the infant has IgM rubella antibodies shortly after birth or IgG antibodies persist for more than 6 months, by the time maternally derived antibodies would have disappeared.



Classical Triad of congenital Rubella

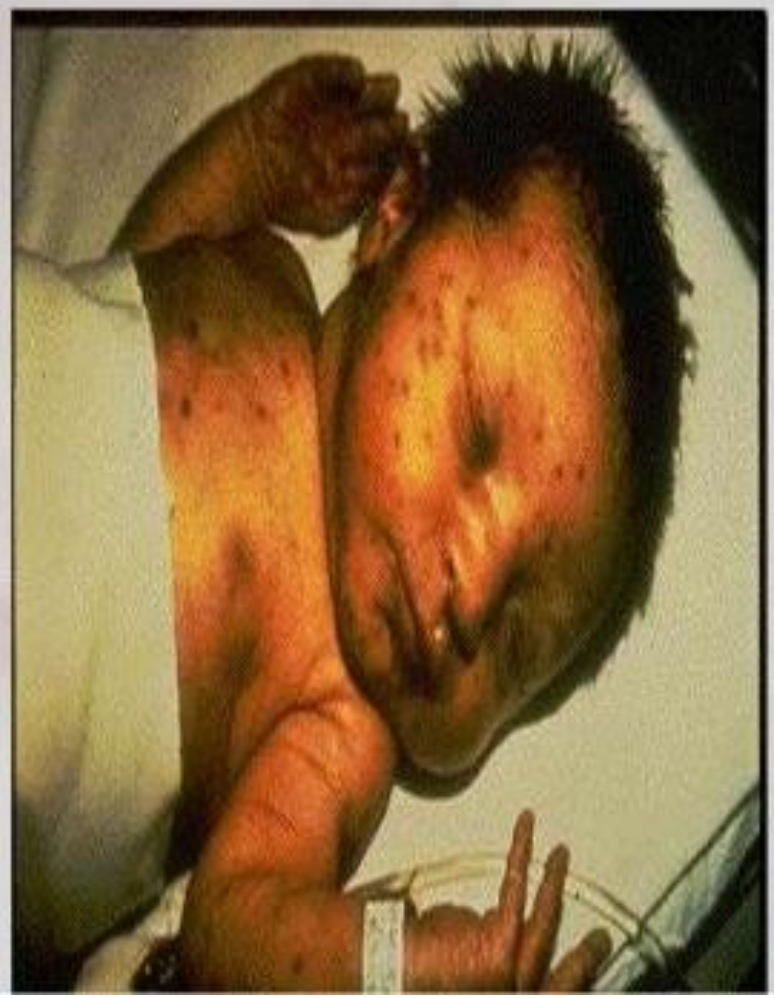
- Cataract
- Cardiac abnormalities
- Deafness



POSTNATAL RUBELLA

Occurs in Neonates and Childhood

- Lasts for 13 – 15 days
- Leads to development of antibodies
- The appearance of antibodies coincides the appearance of suggestive immulogic basis for the rash
- In 20 – 50 % cases of primary infections are subclinical

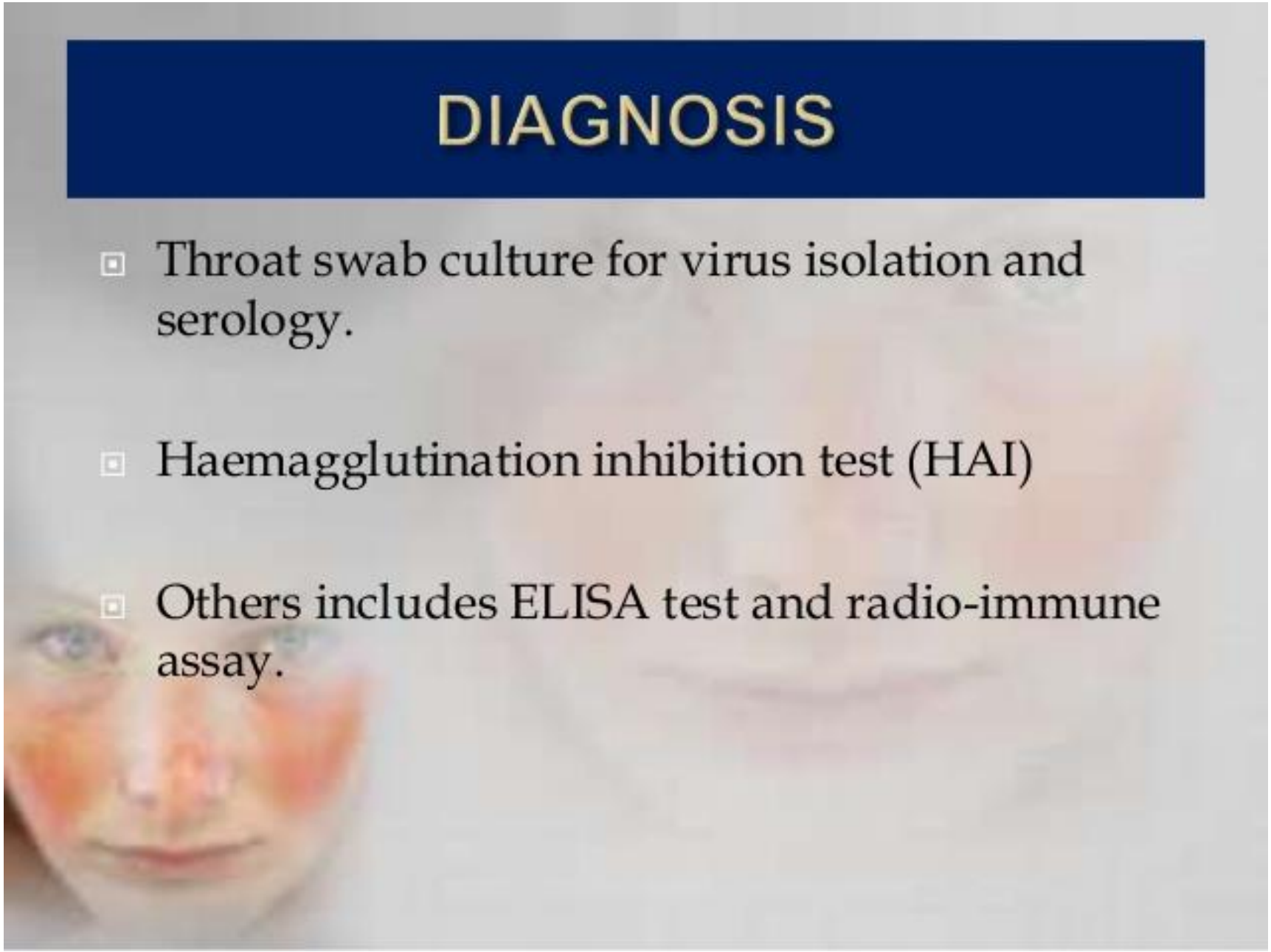


Continue.....

- Other defects includes
  - Glaucoma
  - Retinopathy
  - Microcephalus
  - Cerebral palsy
  - Intrauterine growth retardation
  - Hepato-splenomegaly
  - Mental and motor retardation

DIAGNOSIS

- Throat swab culture for virus isolation and serology.
- Haemagglutination inhibition test (HAI)
- Others includes ELISA test and radio-immune assay.



TREATMENT

- There is no specific treatment for Rubella; management is a matter of responding to symptoms to diminish discomfort.

MMR VACCINE

- The **MMR vaccine** is a mixture of three live **attenuated viruses**, administered via injection for **immunization** against **measles, mumps** and **rubella.**
- It is generally administered to children around the age of one year, with a second dose before starting school (i.e. age 4/5).
- The second dose is not a **booster;** it is a dose to produce immunity in the small number of persons (2-5%) who fail to develop measles immunity after the first dose.