

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Transplacental infections

(Reproductive Block , Microbiology : 2020)

OBJECTIVES;

Upon completion of this lecture, the students should be able to

- To recognize the different types of **infant infections**.
- To know major **transplacentally transmitted pathogens** causing congenital infections .

(Toxoplasma , TP ,ParvoV , VZV, Rubella V & CMV.)

- *To describe their **structures**.*
- To know their major **epidemiology** features.
- *To describe **clinical manifestations** of their congenital infections*
- To illustrate different **laboratory diagnosis** of maternal and congenital infections.
- To know their **treatment** and **preventive** measures.

infant infections

Classification	Timing of events	Mechanisms
Congenital	In utero	Trans placental
Perinatal	During labour and delivery	Exposure to genital secretions and blood
Neonatal	After birth	Direct contact, breast feeding or nosocomial exposure

Congenital infections

- mostly viruses
- previously known as (**TORCH**) infections:

T= **T**oxoplasma gondii,

O=**O**thers

(Treponema pallidum
, Parvovirus & VZV),

R=**R**ubella V,

C=**C**MV,

H=**H**erpes(Hepatitis & HIV),

Congenital infections

Risk of IUI & fetal damage ;

- Type of org.(teratogenic)
 - Type of maternal inf.(1^o,R)
 - Time of inf .(1st,2nd or 3rd)
-
- *1^o Maternal infection in the first half of pregnancy poses the greatest risk to the fetus*

Congenital infections

Common Findings

- Intrauterine growth retardation(IUGR)
- Hepatosplenomegaly(HSM)
- Thrombocytopenia
- Microcephaly

Majority of CI (“asymptomatic”) at birth

Preventative and therapeutic measures ;

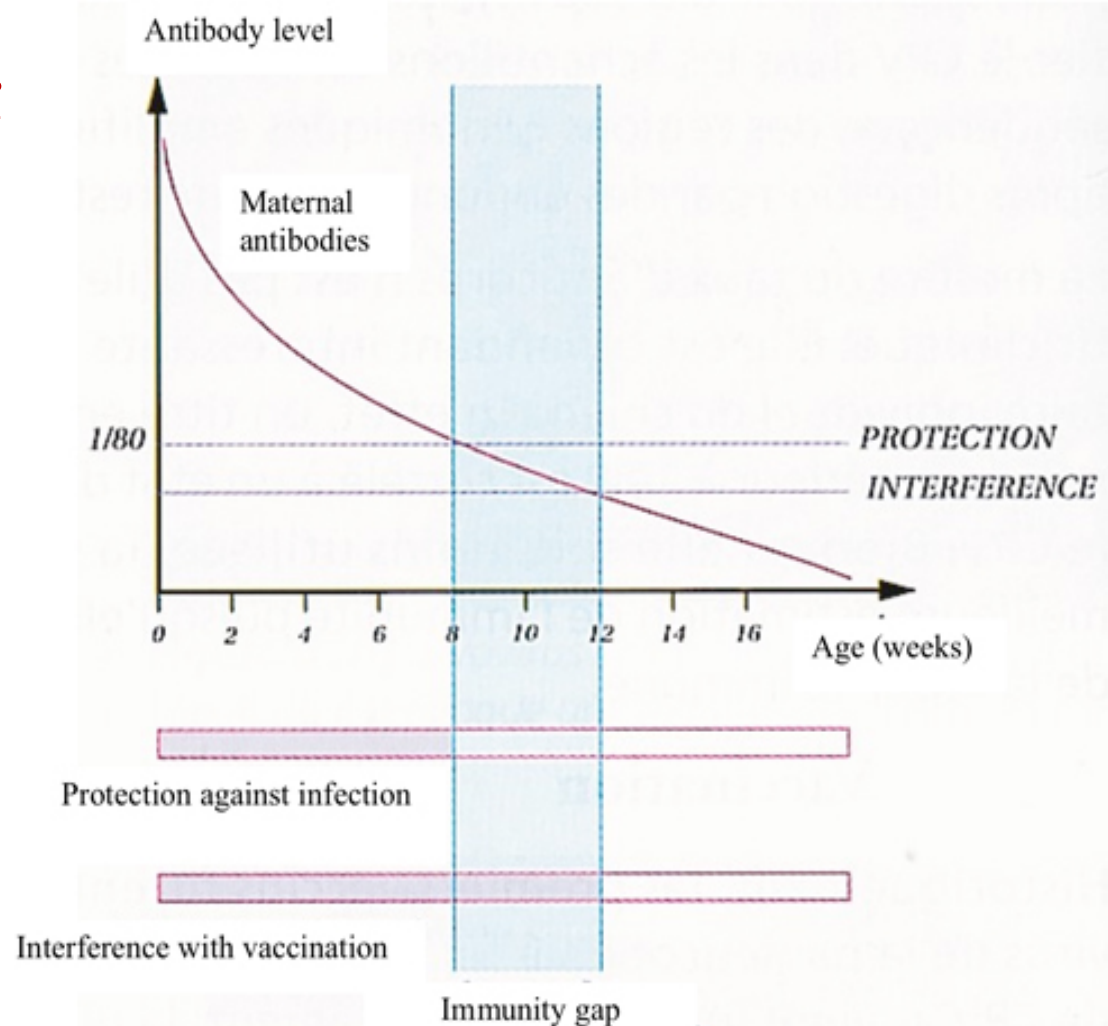
possible for some of the agents

Neonatal serological Dx;

- IgM antibody

Absence of fetal IgM at birth does not exclude infection

- Persistence of specific IgG antibody >12 ms of age



Transplacental infections

(TORCH)

T = Toxoplasma gondii

(*Treponema pallidum*, Parvovirus
& VZV)

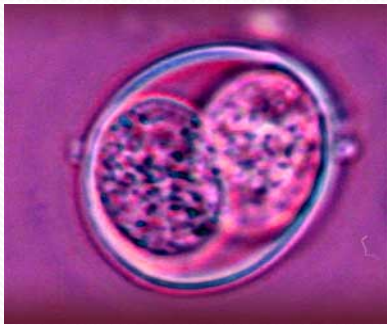
R = Rubella V

C = CMV

Toxoplasma Gondii

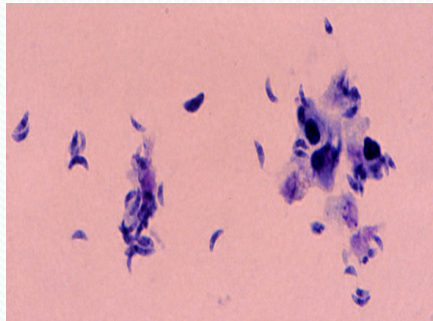
- Obligate intracellular parasite
- Three forms:

Oocysts;



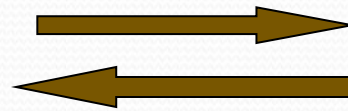
- Shed in cat feces

Tachyzoites;



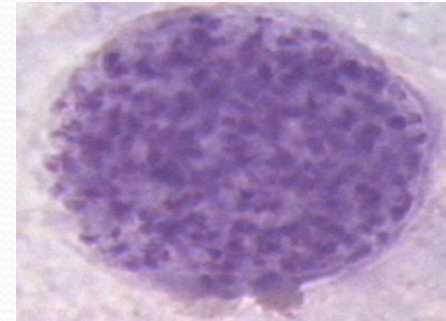
- rapidly dividing forms
- ACUTE PHASE

Immunity +



Immunity -

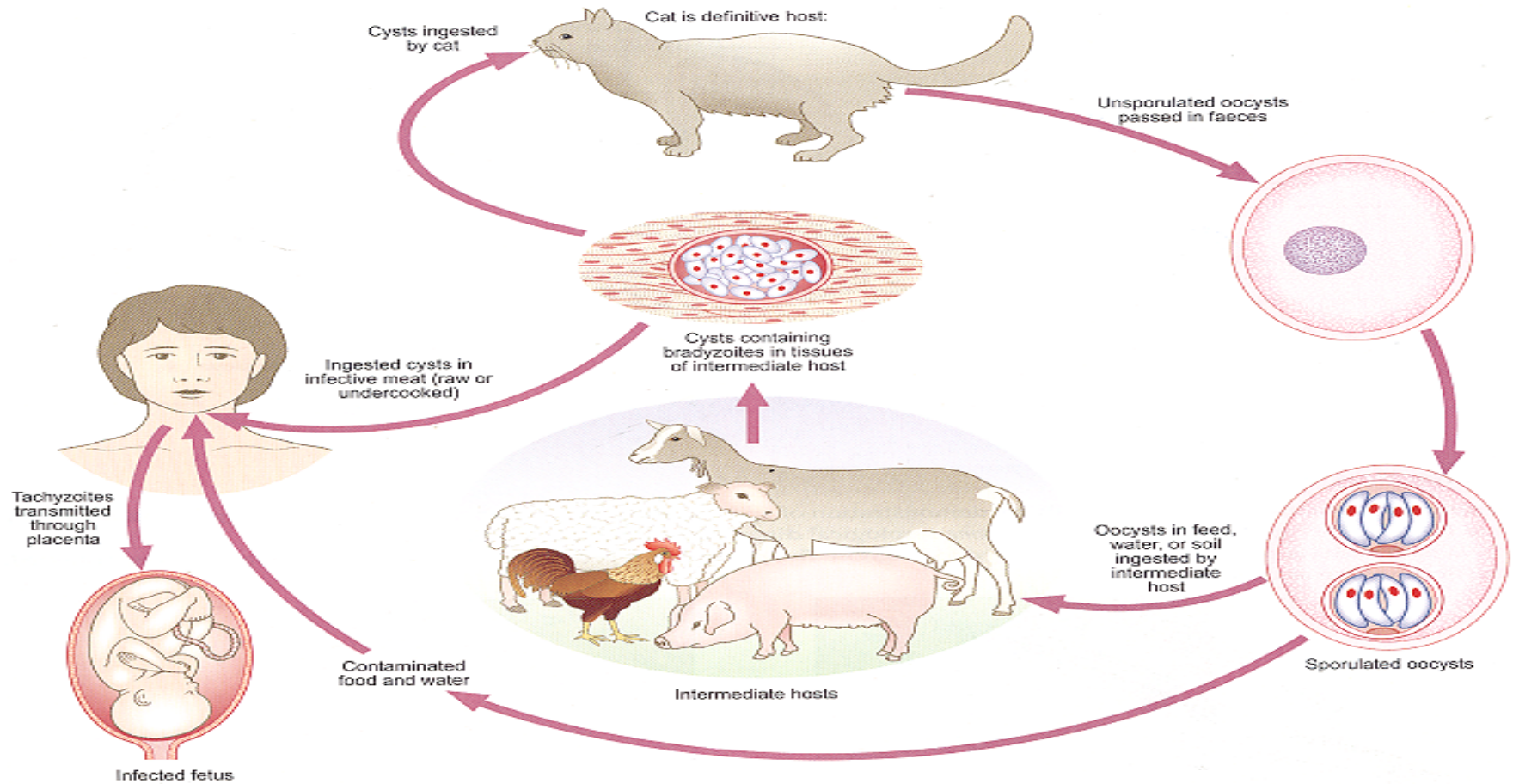
Bradyzoites;



- slowly dividing forms
- CHRONIC PHASE

Toxoplasma gondii

Life cycle



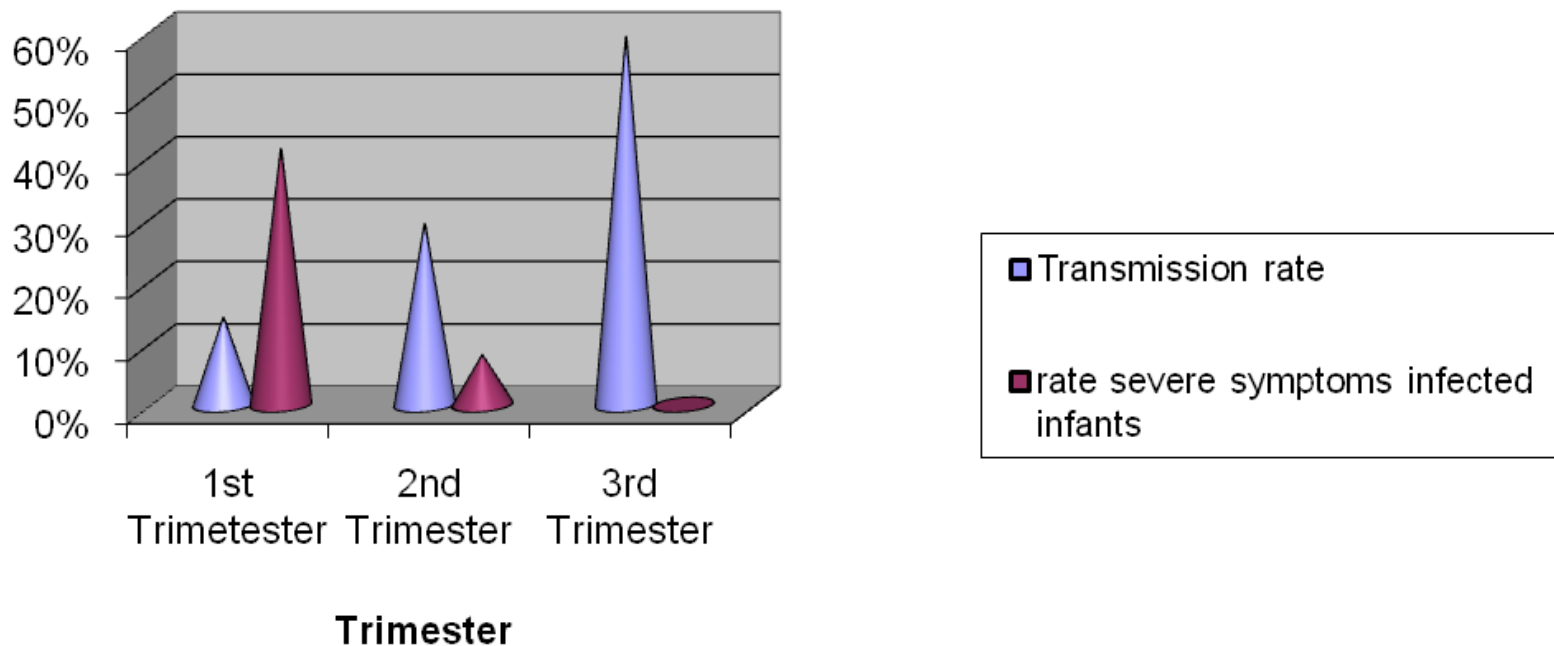
TRANSMISSION:

- Ingestion of oocyst:
Contaminated fingers, soil, water
- Ingestion of cyst in undercooked meat.
- Blood transfusion and organ transplant

Congenital infection ;

- Most cases, due to 1^o maternal inf.
- Rarely, reactivation of a latent inf.

Transplacental Toxoplasma and Congenital Infection

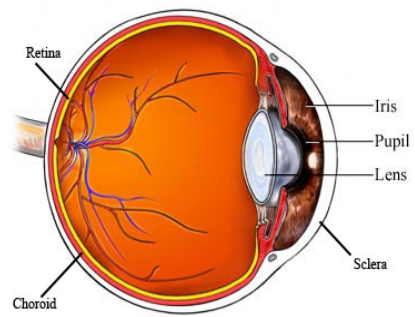
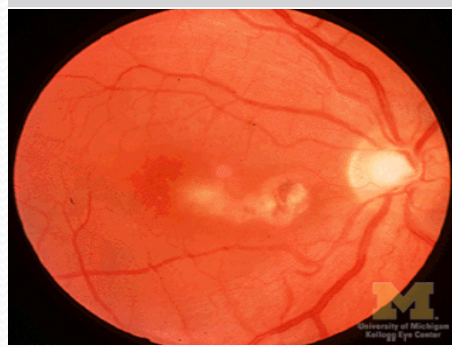


Congenital infection ;

➤ Most (70-90%) are **asymptomatic** at birth but are still at high risk of developing abnormalities, especially eye (chorioretinitis)/neurologic disease(MR) later.

➤ **Classic triad :**

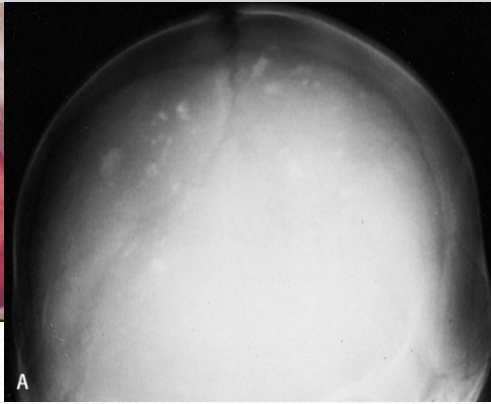
Chorioretinitis



Hydrocephalus



Intracranial calcifications



➤ **Other signs** include ; rash, HSM, jaundice, LAP, microcephaly, seizures, thrombocytopenia.

➤ **Abortion & IUD.**

Dx

● Pregnant mother

- Serology;
 - IgM,
 - IgG
 - IgG avidity
 - IgG seroconversion compared to booking blood.

Infant

*Prenatal Dx;

- Serial U/S
- PCR
- Culture

*Postnatal Dx;

- Serology;
 - IgM
 - ↑ IgG or persistently +ve >12 ms
- PCR
- Culture
- Evaluation of infant (ex, neuroimaging)

Rx

- Spiramycin.
- pyrimethamine & sulfadiazine.

Prevention

Avoid exposure to cat feces;

Wash :- hands with soap and water

- fruits/vegetables,

- surfaces that touched

fruits/vegetables/raw meat.

Cook all meats thoroughly



Transplacental infections

(TORCH)

T = Toxoplasma gondii,

O = Other

(Treponema pallidum

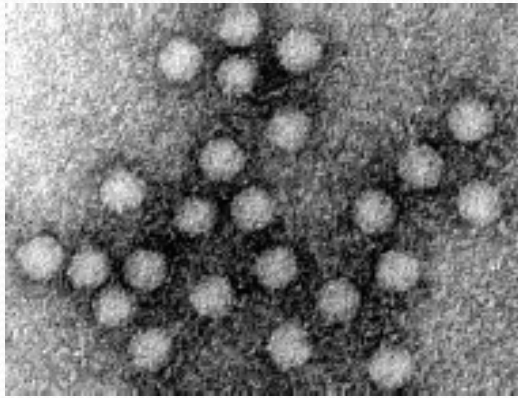
, *Parvovirus* & VZV),

R = Rubella V

C = CMV

Parvovirus B₁₉

Parvoviridae



non developed V.
Icosahedral capsid
& s.s DNA genome.

Epidemiology:

- Worldwide distribution
- Humans are known hosts
- Transmission
 1. Respiratory route
 2. Blood transfusion
 3. Transplacental route

Clinical presentation;

1.Acquired infection;

*Immunocompetent host

*Immunocompromised pts

Erythema infectiosum



2.Congenital infection;

Congenital infection

- Risk of congenital infection is greatest when inf occur in 1st 20 wks
- 1. Inf in the 1st trimester → IUD (Intrauterine death)
- 2. Inf in the 2nd trimester → HF (Hydrops fetalis)
- 3. Inf in the 3rd trimester → Lowest risk

➤ Cause fetal loss through hydrops fetalis, severe anaemia, CHF, generalized oedema and fetal death



Dx

- Pregnant mother;
 - Specific IgM.
 - IgG seroconversion.
- Prenatal Dx;
 - U/S (hydrops)
 - Not grow in c/c.
 - PCR

Rx:

Intrauterine transfusion

Prevention:

- Hygiene practice
- No vaccine (TRIAL)

Transplacental infections

(TORCH)

T= Toxoplasma gondii,

O=Other

(Treponema pallidum, *Parvovirus*
& *VZV*),

R=Rubella V

C=CMV

Varicella Zoster Virus VZV

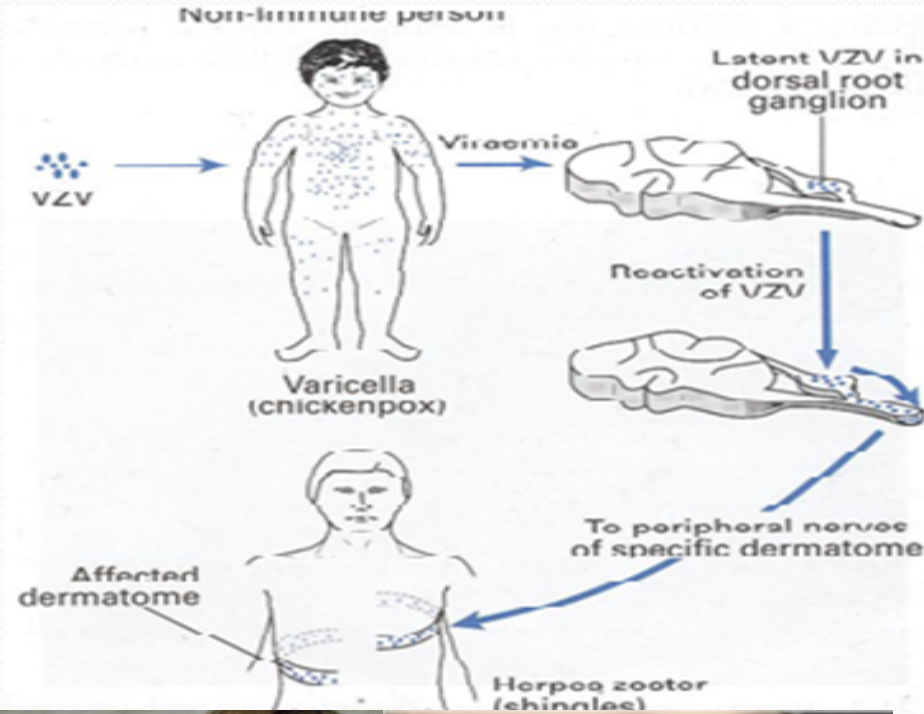
Herpesviridae

*dsDNA, Enveloped,
Icosahedral Virus*



Transmission

- Respiratory route
- Transplacental route



Clinical presentations

- **Acquired infection ;**
 - ❖ Varicella : Chickenpox:
 - ❖ 1^o illness
 - ❖ Generalized vesicular rash
 - ❖ Zoster: Shingles:
 - ❖ Recurrent inf
 - ❖ Localized VR
- **Congenital infection ;**



VZV infection in Pregnancy

- Primary infection carries a greater risk of severe disease, in particular pneumonia.

Intrauterine infections

❖ congenital varicella syndrome ;

- 1st 20 weeks of Pregnancy
- The incidence of CVS is ~ 2%
 - Scarring of skin
 - Hypoplasia of limbs
 - CNS defects
 - eye defects



❖ Neonatal varicella ;

- < 5 days of delivery → severe disease
- > 5 days before delivery → mild disease

Diagnosis

VZV

Pregnant mother

A. Direct ex:

- Vesicular fluid for virus isolation
- Cells scraping from the base of vesicles



ImmunoFluorescent test (Ag)

- DNA-VZV by PCR

B. Serological test:

IgM AB

Infant;

A. Prenatal Dx

1. U/S
2. VZV DNA in FB or AF or placenta villi.

B. Postnatal Dx

1. VZV IgM
2. virus isolation
3. VZVDNA in VF or CSF (CNS inf)

Rx

- *Acyclovir*

Prevention;

Pre exposure;

Varicella vaccine (LAV)

Post exposure;

VZIG

- susceptible **pregnant** women have been exposed to VZV.
- **infants** whose mothers develop **V < 5** to **2** days after delivery.

Transplacental infections

(TORCH)

T = Toxoplasma gondii,

O = Other

(Treponema pallidum, Parvovirus
& VZV)

R = Rubella V

C = CMV

Rubella Virus

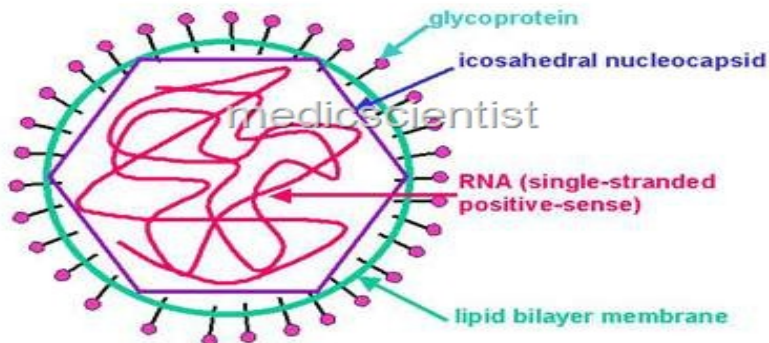
Togaviridae

❖ SS RNA genome

Icosahedral capsid

Enveloped Virus

RUBELLA VIRUS



Epidemiology:

- Humans
- Transmission
 - Respiratory route
 - Transplacental route
- A world wide distribution ↓ ed . ?

Clinical manifestation:

➤ *Acquired infection ;*

Ex. Maculopapular rash
(Rubella = German measles)

➤ *Congenital infection;*

Normal \implies CRS \implies IUD

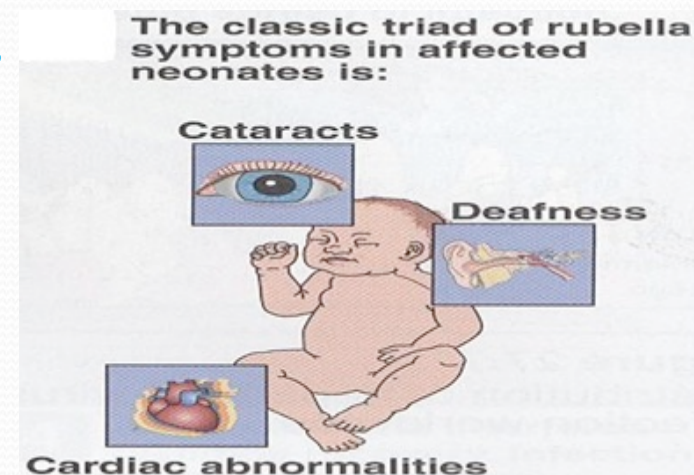
- Risk of acquiring congenital rubella infection varies and depends on gestational age of the fetus at the time of maternal infection.

gestational age

- 0-12 wks
- 13-16 wks
- >16 wks

risk to fetus

70%
20%
Infrequent



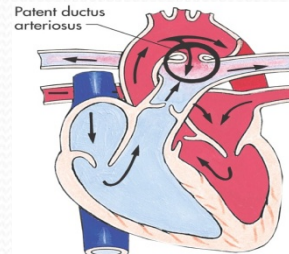
Congenital Rubella Syndrome

Triad of abnormalities

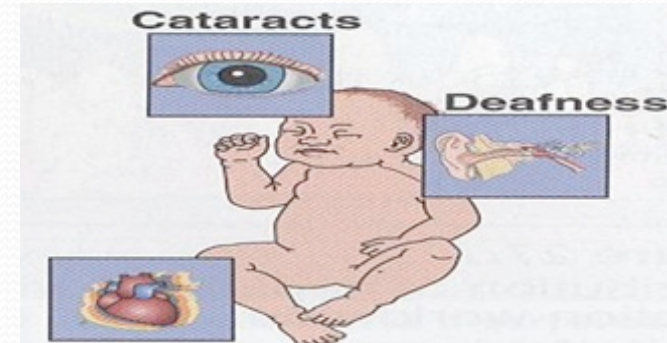
- Sensorineural hearing loss*
- Cataracts and glaucoma
- Cardiac malformations (patent ductus arteriosus)
- Neurologic defects
- Others

growth retardation,
bone disease,
HSM, thrombocytopenia,
“blueberry muffin” lesions

Affecting ears , eyes & heart



From Hackberry MJ et al. Wong's nursing care of infants and children, ed 7, St Louis, 2003, Mosby.
Medical facts and details. Photo copyright © 2004, 2000 by Mosby, Inc.



Dx;

Pregnant mother

- Serological diagnosis
- 1. Rubella specific IgM
- 2. IgG seroconversion

Infant

*Prenatal Dx;

- U/S
- Culture
- PCR

*Postnatal Dx;

- Serology;
 - IgM
 - Persistence of IgG
>9-12 ms
- Culture
- PCR

Prevention:

- Rubella vaccine ;(LAV)
- Routine antenatal screening:
Rubella specific IgG

Non-immune women → vaccination
(avoid pregnancy for 3 months).

Transplacental infections

(TORCH)

T= Toxoplasma gondii,

O=Other

(*Treponema pallidum*, *Parvovirus*
& *VZV*),

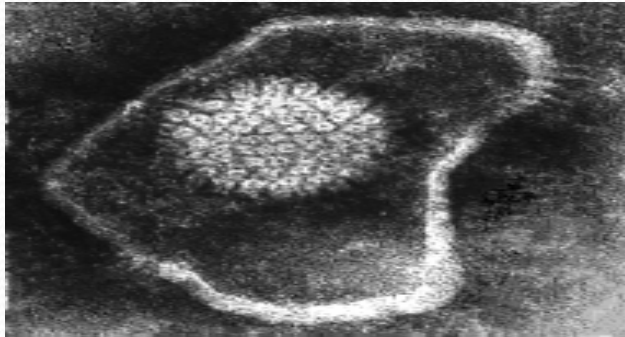
R=Rubella V

C=CMV

Cytomegalovirus CMV*

Herpesviridae

*dsDNA, Enveloped,
Icosahedral Virus.*



Establishes in latent form

↓
reactivation

↓
Recurrent inf

Epidemiology

Human, worldwide.

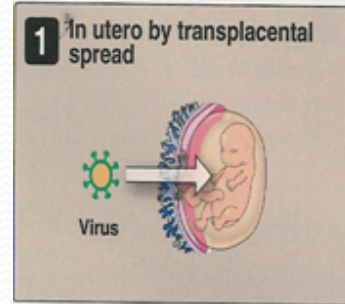
Transmission (tn)

1- Horizontal tn

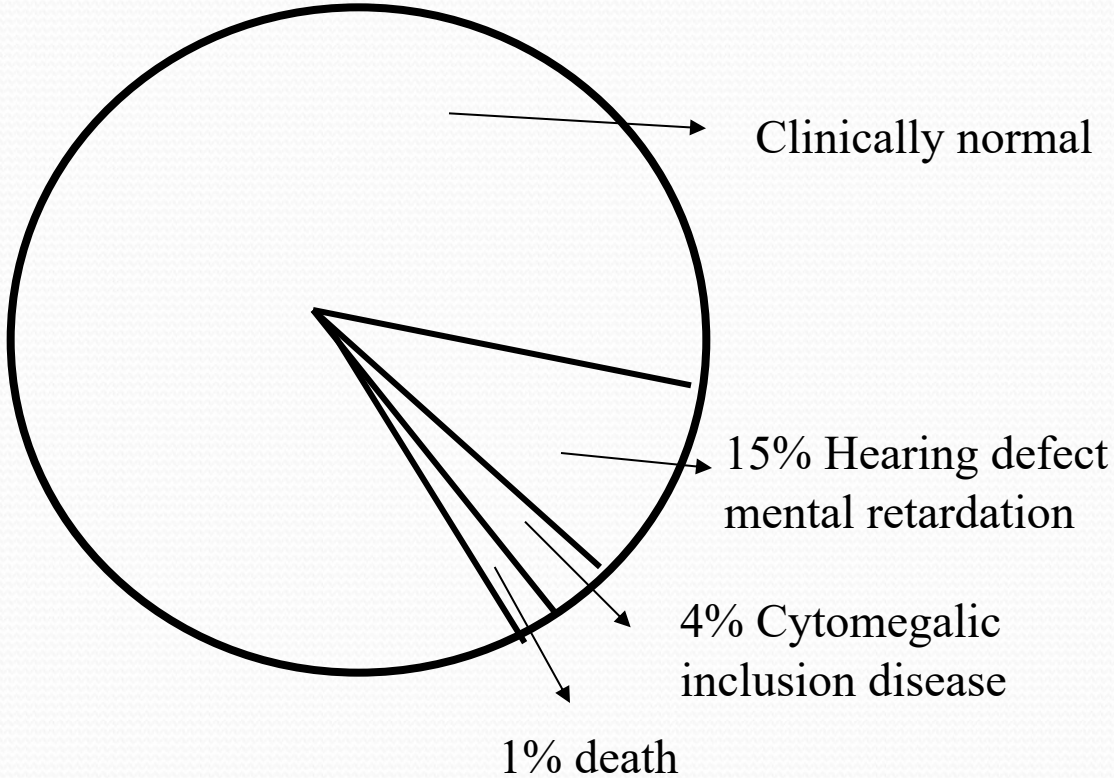
- Young children: saliva
- Later in life: sexual contact
- Blood transfusion
& organ transplant

2- Vertical tn

↓ ↓
1° CMV inf . Recurrent CMV inf
(~40%) (~1%)



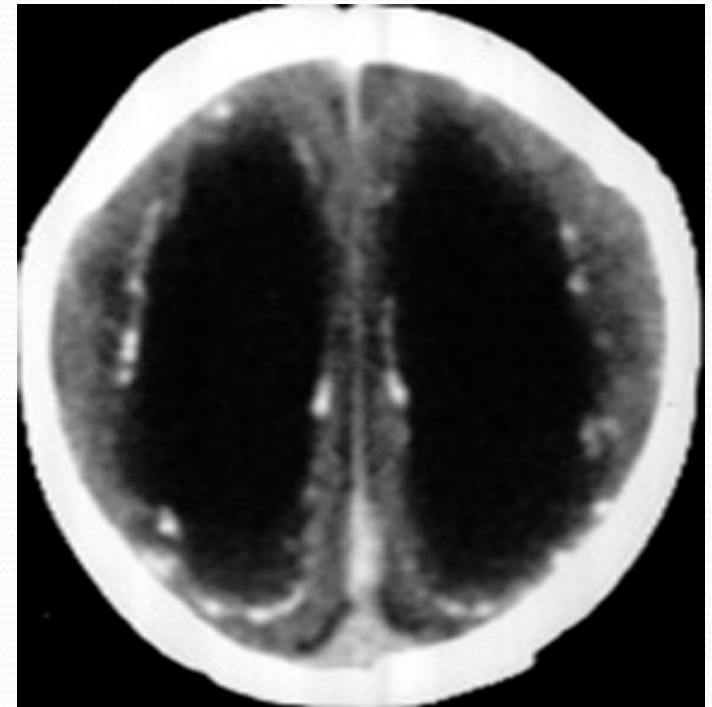
Congenital Infections:



Cytomegalic Inclusion Disease;

- CNS abnormalities - **microcephaly**, periventricular **calcification**.
- Eye - chorioretinitis
- Ear - sensorineural deafness
- Liver – HSM and jaundice.
- Lung - pneumonitis
- Heart - myocarditis
- **Thrombocytopenic** purpura

Ventriculomegaly & calcifications
of congenital CMV



Dx.

- Maternal :

Serology ;

- CMV IgM
- CMV IgG
- CMV IgG avidity

- Prenatal :

- *Ultrasound*
 - culture
 - PCR

- Postnatal:

by *isolating CMV or detection of its genome* in first 3 wks of life.

Body fluid : urine, saliva, blood.

▪By

- Standard tube culture method
- Shell vial assay
- PCR

Histology;

- Detection of Cytomegalic Inclusion Bodies in affected tissue

Serology; CMV IgM



Intranuclear I B [Owl's -eye]

Rx

- **Symptomatic** infants → Ganciclovir .

Prevention !?

*Education about CMV
& how to prevent it
through hygiene;
hand washing*

*Vaccine is not available
(TRIAL)*



OBJECTIVES;

- Types of infant infections.
- Major transplacentally transmitted pathogens causing congenital infections .

*Toxoplasma ,
Treponema pallidum ,
Parvovirus ,
Varicella Zoster Virus,
Rubella virus ,
Cytomegalovirus.*

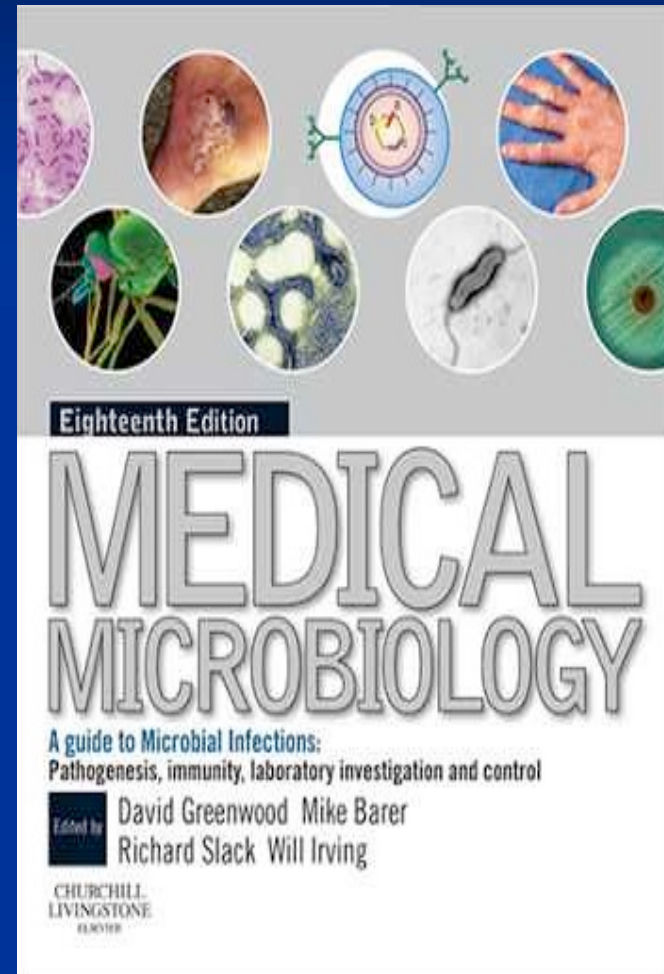
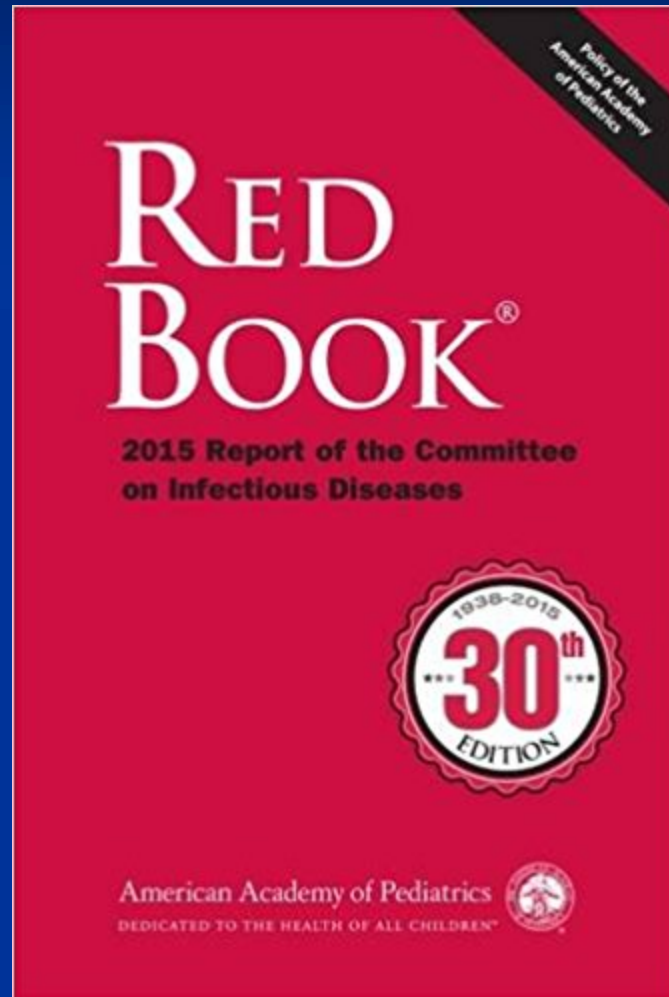
Their major features & epidemiology .

Manifestations of congenital infection.

Diagnosis of congenital infection.

Their Treatment and Prevention.

Reference books



فضل العلم

من سلك طريقا يلتمس فيه علما سهل الله له طريقا إلى الجنة وإن الملائكة لتضع أجنحتها
رضا لطالب العلم وإن طالب العلم يستغفر له من في السماء والأرض حتى الحيتان في الماء وإن
فضل العالم على العابد كفضل القمر على سائر الكواكب، إن العلماء هم ورثة الأنبياء
إن الأنبياء لم يورثوا دينارا ولا درهما إنما ورثوا العلم فمن أخذه أخذ بحظ وافر

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