Transplacental infections

(Reproductive Block , Microbiology : 2020)

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OBJECTIVES;

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

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

  (*Toxoplasma , TP ,Parvo V , 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= Toxoplasma gondii,
O=Others
(*Treponema pallidum*
,Parvovirus &VZV),
R=Rubella V,
C=CMV,
H=Herpes(Hepatitis &HIV),

Congenital infections

Risk of IUI & fetal damage ;

- Type of org.(teratogenic)
- Type of maternal inf.(*1°*,R)
- Time of inf .(*1st*,*2nd* *or* *3rd*)

- *1° 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 ;

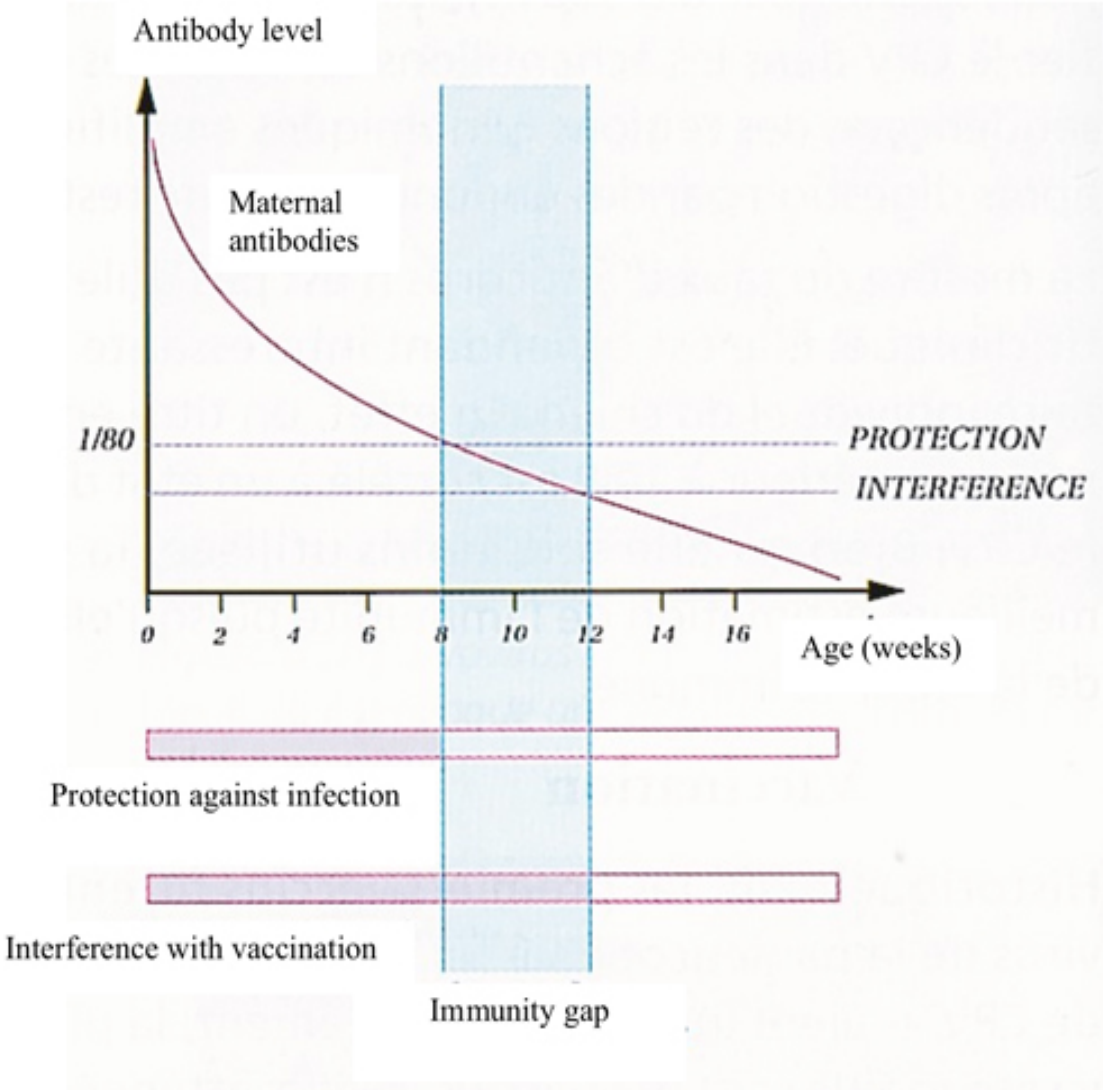
possible for some of the agents

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

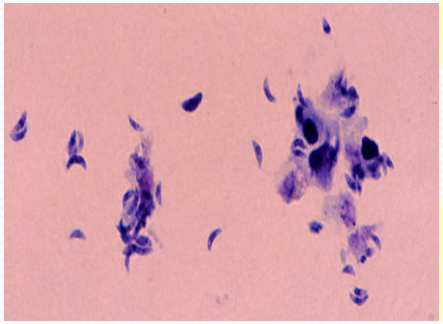
Toxoplasma Gondii

- Obligate intracellular parasite
- Three forms:

Oocysts;

- Shed in cat feces

Tachyzoites:

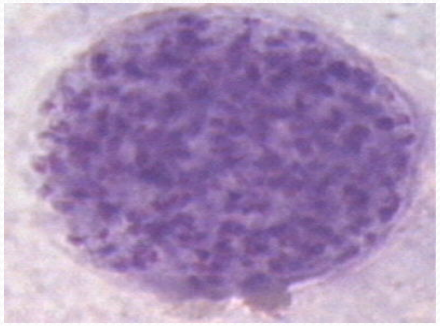


Immunity +

Immunity -

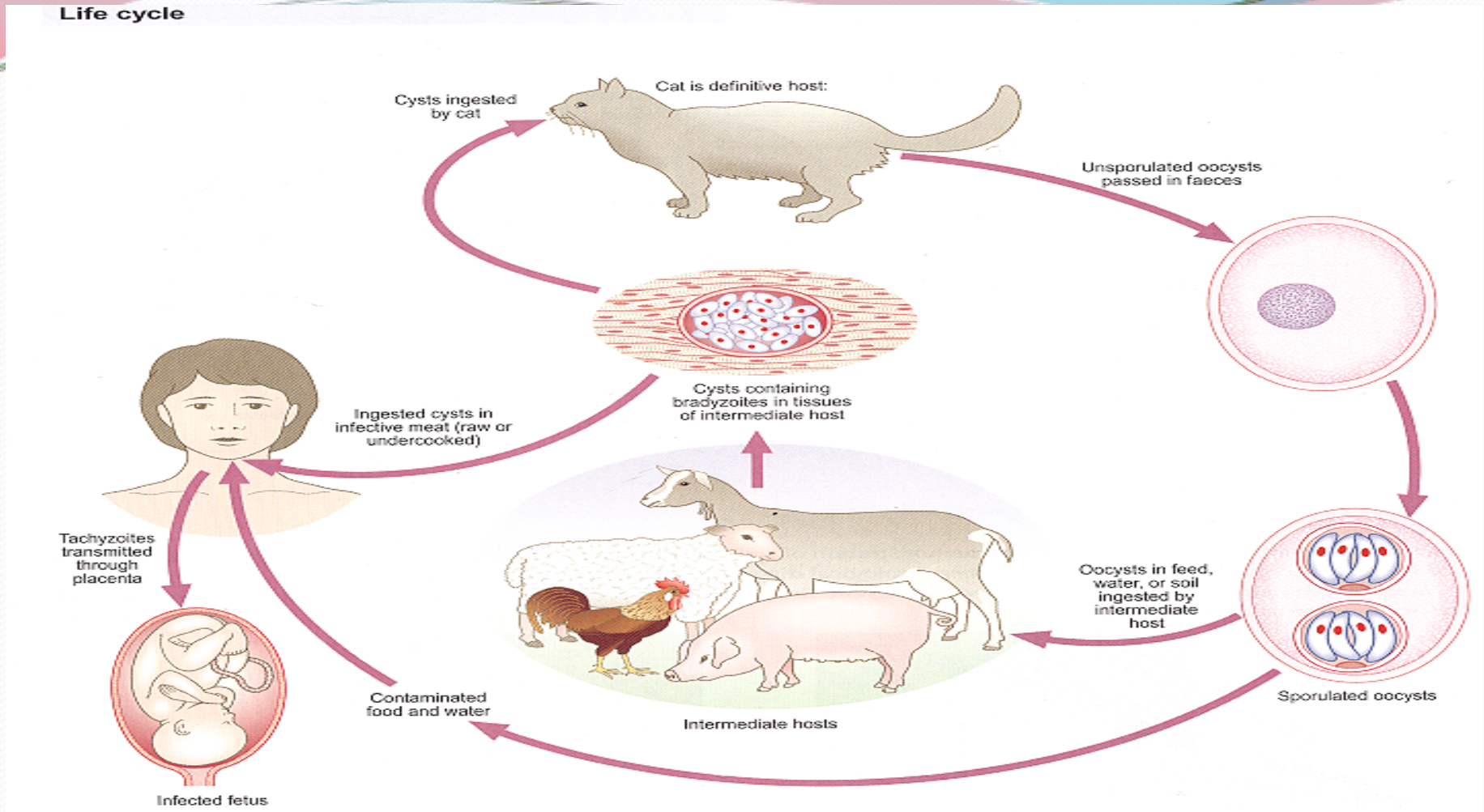
- **rapidly dividing forms**
- **ACUTE PHASE**

Bradyzoites:



- **slowly dividing forms**
- **CHRONIC PHASE**

Toxoplasma gondii,

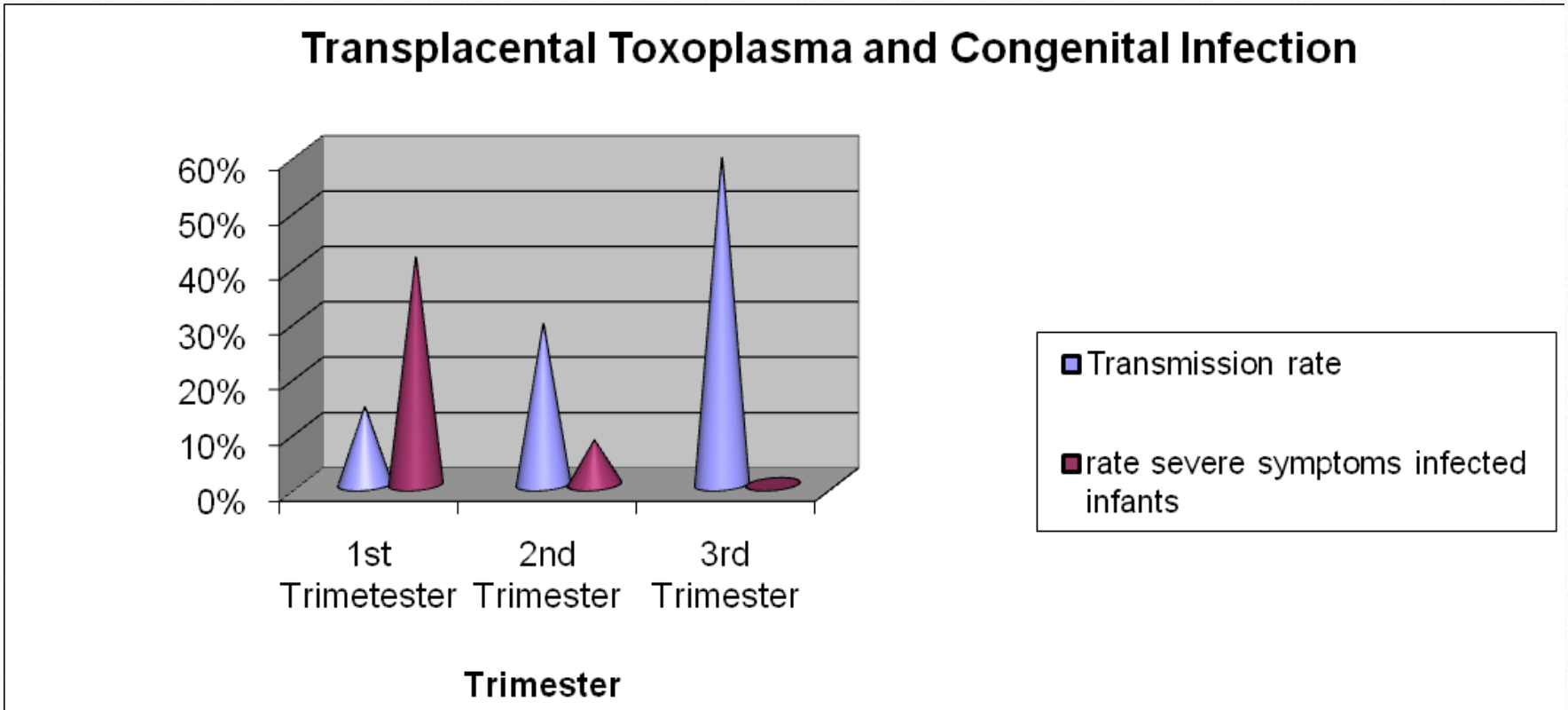


TRANSMISSION:

- 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^{0}** maternal inf.
- Rarely, reactivation of a latent inf.



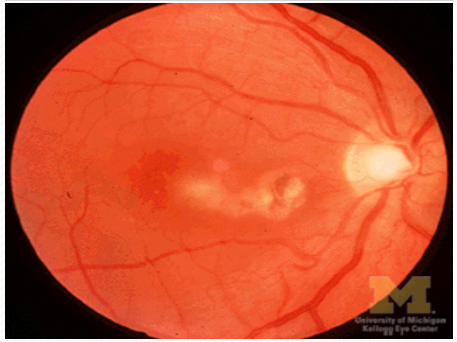
TOXO

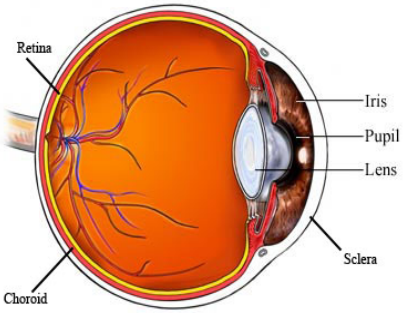
Congenital infection ;

- 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 :**

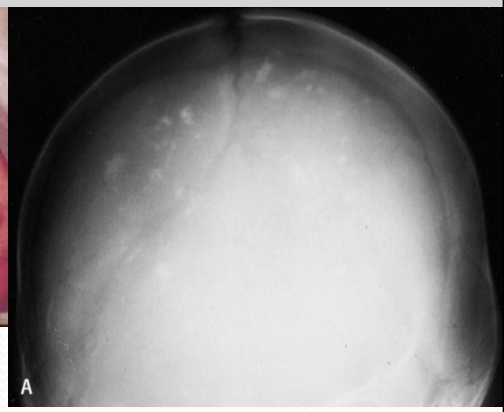
Chorioretinitis





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;

- PCR
- Culture
- Serology;
  - IgM
  - ↑IgG or persistently +ve >12 ms
- Evalution 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*

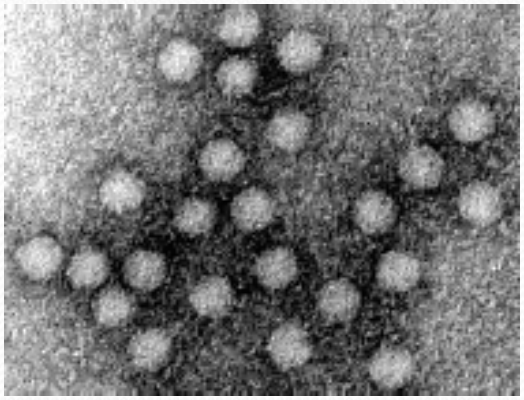
,***Parvovirus*** &VZV),

R=Rubella V

C=CMV

Parvovirus B_{19}

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

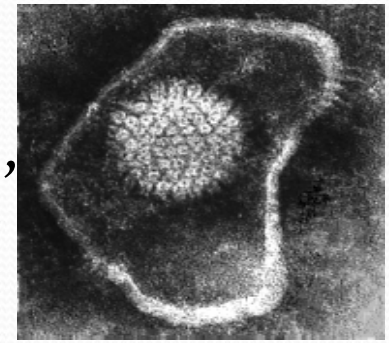
(*Treponema pallidum* ,***Parvovirus*** & ***VZV***),

R=Rubella V

C=CMV

Varicella Zoster Virus *VZV*

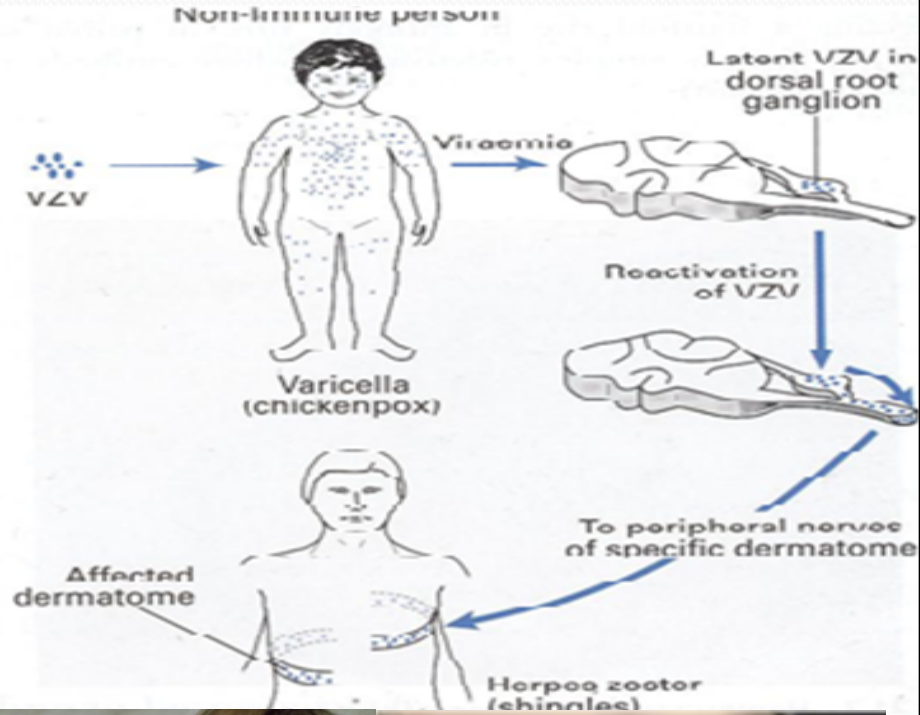
Herpesviridae



dsDNA , Enveloped , Icosahedral Virus

Transmission

- Respiratory route
- Transplacental route



Clinical presentations

- ***Acquired infection ;***
  - Varicella : Chickenpox:
    - 1º 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 AF or FB 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)

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

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C=CMV

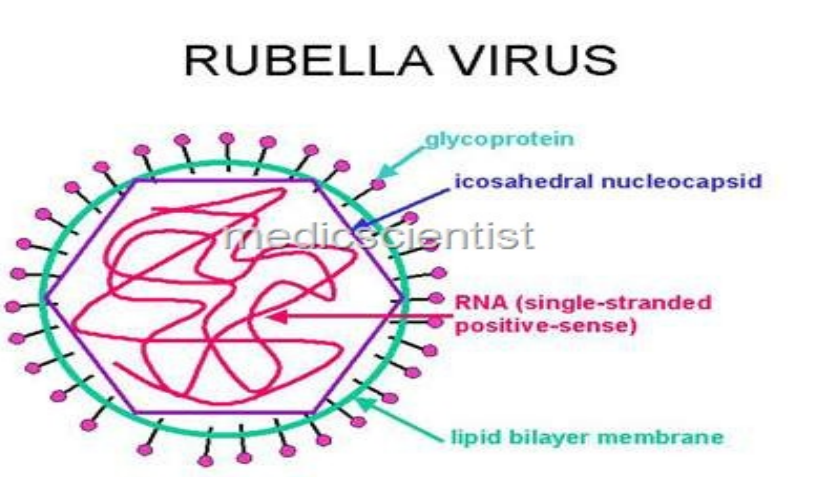
Rubella Virus

Togaviridae

- SS RNA genome

Icosahedral capsid

Enveloped Virus



Epidemiology:

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

RV

Clinical manifestation:

➢ Acquired infection ;

Ex. Maculopapular rash

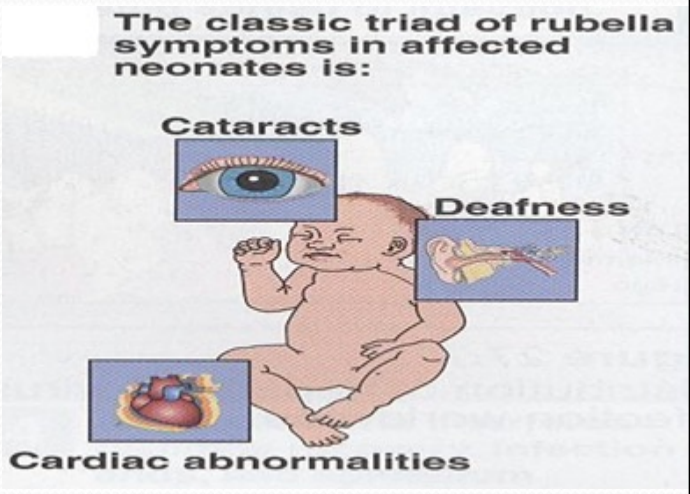
(Rubella = German measles)

➢ Congenital infection;

Normal ⟶ CRS ⟶ IUD

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

gestational age	risk to fetus
0-12 wks	70%
13-16 wks	20%
>16 wks	Infrequent



Congenital Rubella Syndrome

Triad of abnormalities

- Sensorineural hearing loss*
- Cataracts and glaucoma
- Cardiac malformations

(patent ductus arteriosus)

- Neurologic defects
- Others

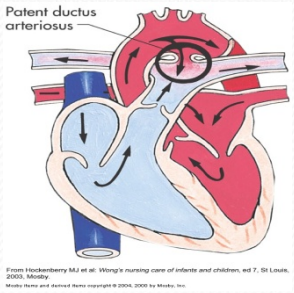
growth retardation,

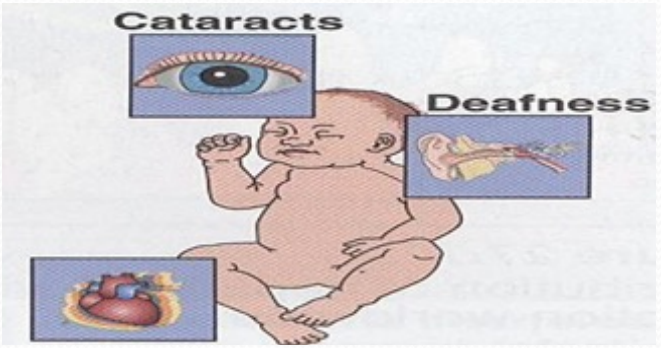
bone disease,

HSM, thrombocytopenia,

"blueberry muffin" lesions

Affecting ears , eyes & heart





"Blueberry muffin" spots

RV

Dx;

Pregnant mother

- Serological diagnosis

1. Rubella specific IgM
2. IgG seroconversion

Infant

*Prenatal Dx;

- U/S
- Culture
- PCR

*Postnatal Dx;

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

Prevention:

- **Rubella vaccine** ;(LAV)

- **Routine antenatal screening:**
  Rubella specific IgG

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

Transplacental infections

(TORCH)

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

R=R*ubella* V

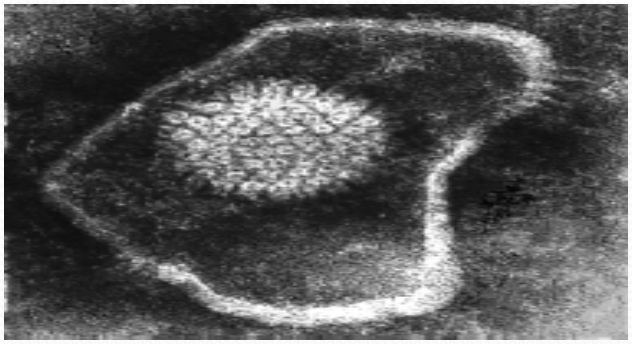
C=CMV

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

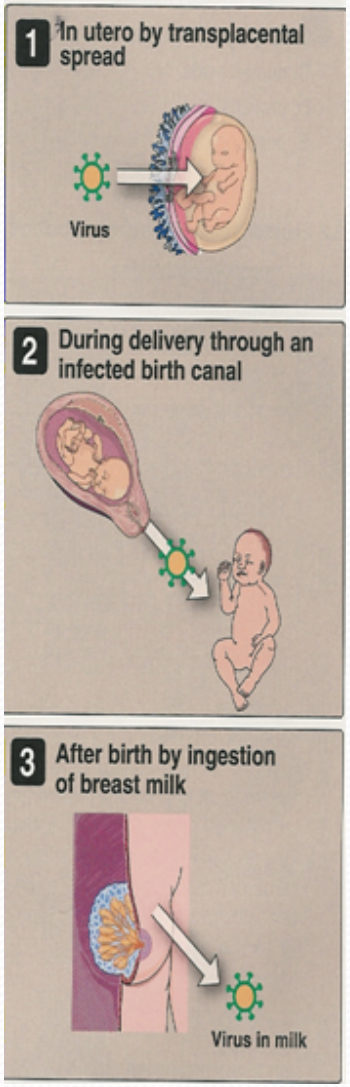
& organ transplant

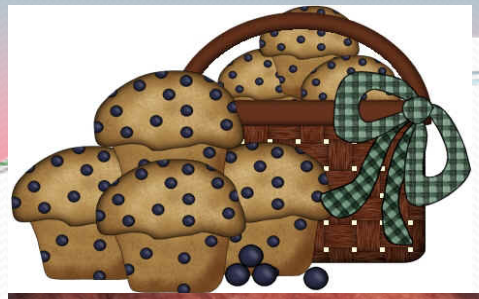
2- Vertical tn

⬇ ⬇

1º CMV inf . (~40%)

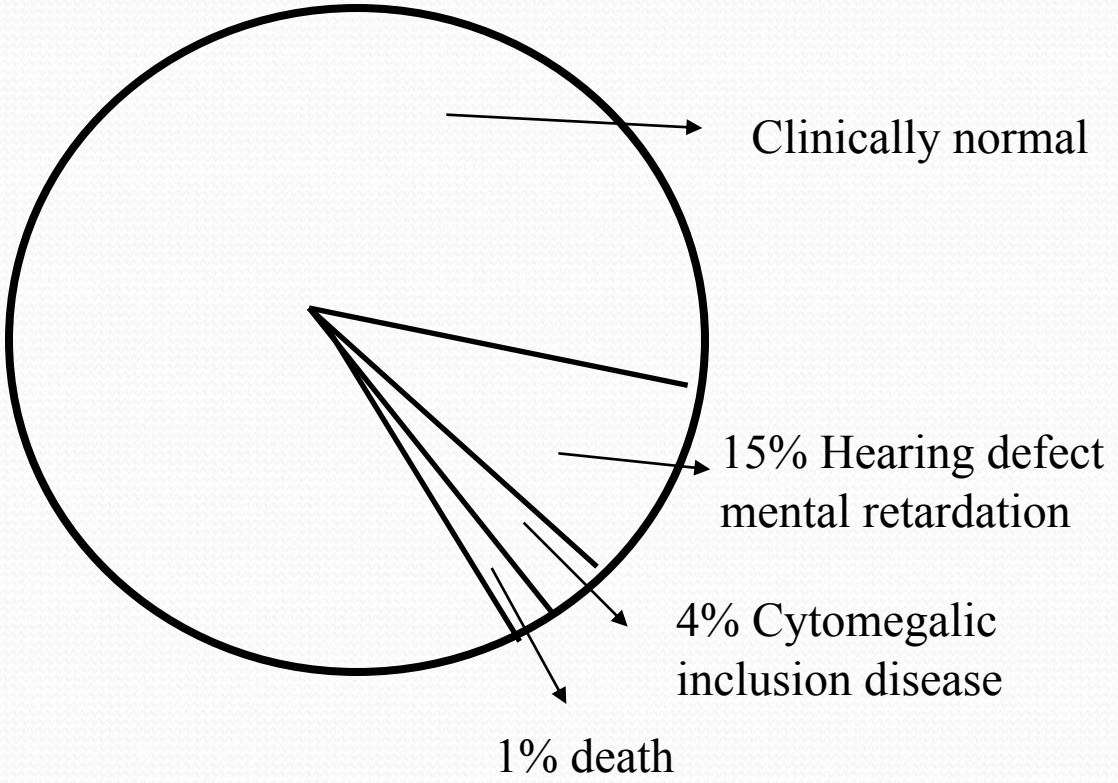
Recurrent CMV inf (~1%)





CMV

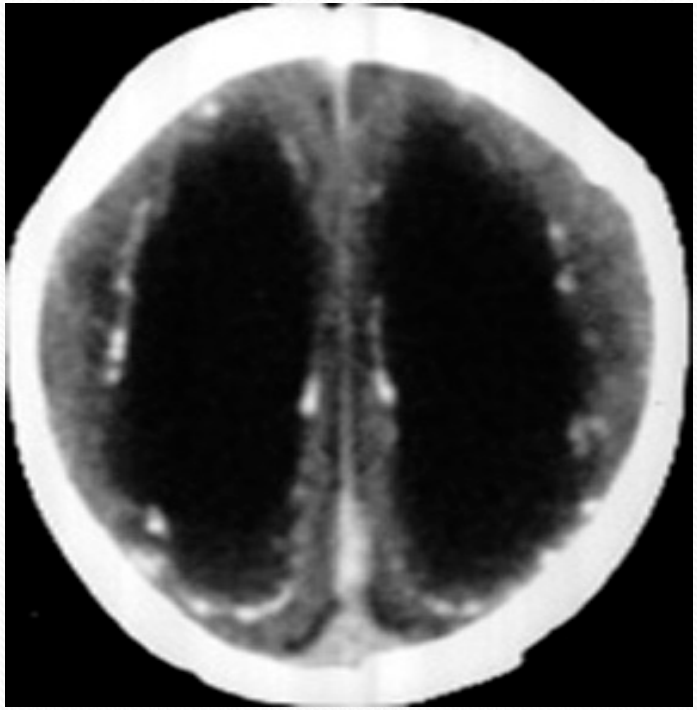
Congenital Infections:



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

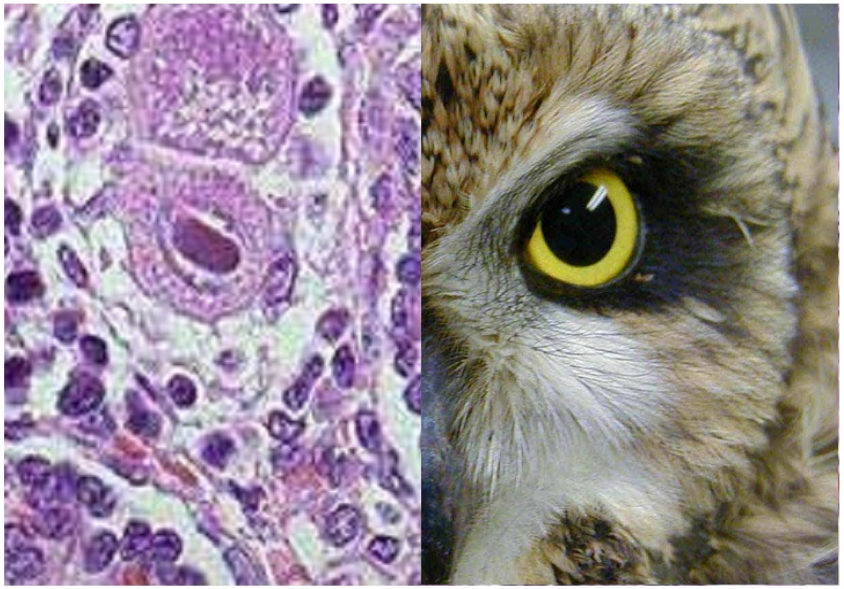


Dx.

- **Maternal :**

Serology ;

- CMV IgM
- CMV IgG
- CMV IgG avidity



Intranuclear I B [Owl's -eye]

- ***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

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 transplacentaly transmitted pathogens causing congenital infections .

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

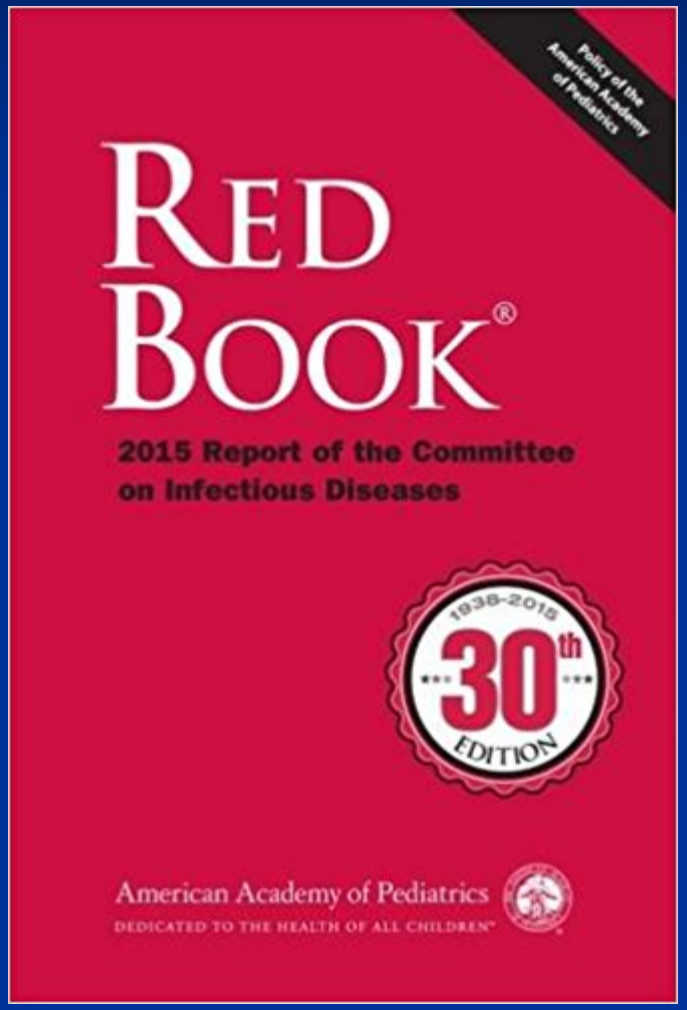
Their major features & epidemiology .

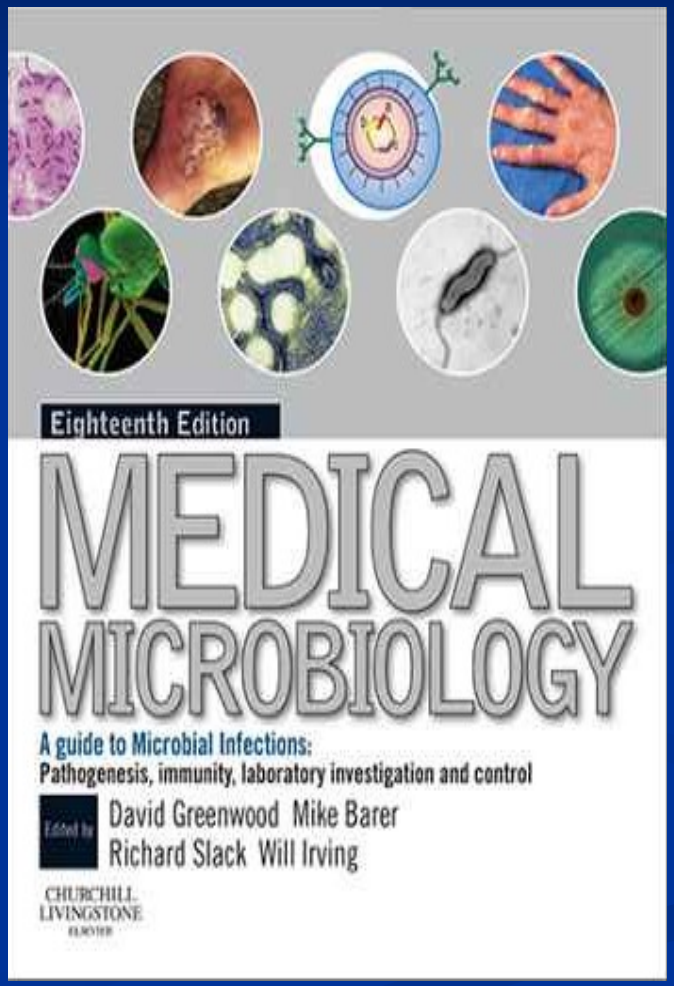
Manifestations of congenital infection.

Diagnosis of congenital infection.

Their Treatment and Prevention.

Reference books






وقل رب زدني علما
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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