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Microbiology Team

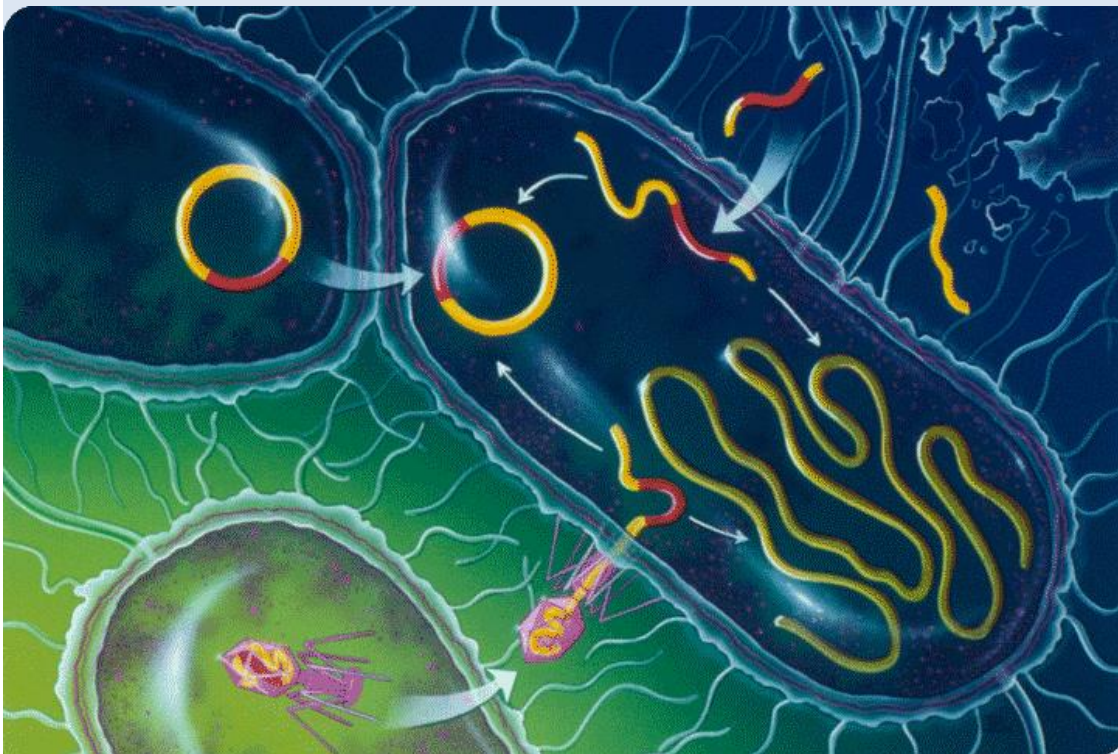
Transplacental Infections

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“ Team’s notes - girls’ slides - important “

Classification	Occurrence	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

Types of Congenital Infections:

- mostly viruses
- **(Torch) infections:**
- **T**oxoplasmosis
- **O**ther (syphilis, parvovirus & VZV)
- **R**ubella
- **CMV** “Cytomegalovirus”
- **H**erpes(**H**epatitis & **H**IV)

Risk of IUI & fetal damage depends on: IUI = intrauterine infection

1. Organism (Teratogenicity).

Strong teratogenicity effects → like Parvovirus and rubella.

Mild teratogenic effects → like CMV and syphilis.

2. Type of maternal infection (Primary, recurrent).

1^o maternal infection in the first half of pregnancy poses the greatest risk to the fetus.

3. Time during pregnancy (1st, 2nd, 3rd Trimester).

Infections in early pregnancy are more dangerous.

Majority of CI (“asymptomatic”) at birth

TOXOPLASMOSIS

Organism: Toxoplasma gondii

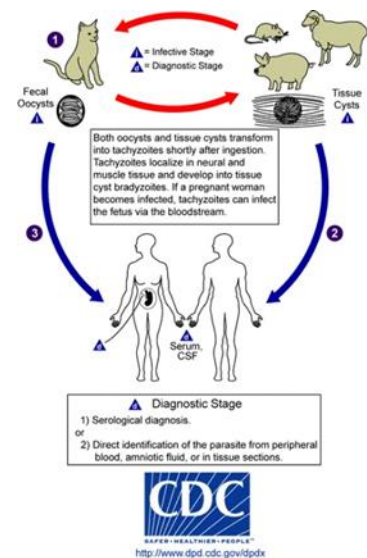
Definitive host is the domestic cat.

Transmission:

1. **Aerosolization** of stool and inhalation.
2. Ingestion of cysts (meats, garden products).
3. Ingestion of oocyst:
 - Contaminated fingers ,soil ,water.
 - Blood transfusion and organ transplant

Epidemiology:

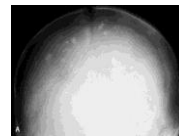
- Mostly in European countries (**i.e. France, Turkey**).
- **Usually asymptomatic.**
- **Infection (Transmission) rate higher with infection in 3rd trimester.**
- **Fetal death higher with infection in 1st trimester.**



This means that it is more likely for the fetus to get infected during the 3rd trimester; which is safer than getting infected in the 1st trimester.

Clinical presentation:

- Mostly asymptomatic at birth but are still at high risk of developing abnormalities, especially eye (chorioretinitis)/neurologic disease(MR) later.
- Classic triad of symptoms:
 1. **Chorioretinitis.** (Inflammation of the choroid and retina of the eye).
 2. **Hydrocephalus.**
 3. **Intracranial calcifications** (Calcification anywhere in the Skull).



Diagnosis:

Maternal serology : IgM/IgA , IgG, IgG avidity , seroconversion - compared to booking blood.

Infant:

- **Prenatal**
PCR
Culture
Serial U/S
- **Postnatal**
Serology;
IgM, IgA,
IgG or persistently +ve >12 ms
PCR
Culture
Evaluation of infant
(ex, neuroimaging)

Treatment

1. Spiramycin.
2. Pyrimethamine and sulfadiazine.

Prevention

1. Avoid exposure to cats, contaminated food or water and undercooked meat.
2. Hand washing.

SYPHILIS

- Treponema pallidum (spirochete).
- Transmitted via sexual contact.
- Mother with **primary** or **secondary** syphilis.
- Typically occurs during **second half** of pregnancy.

Clinical features:

Fetal: Stillbirth, Neonatal death, Hydropsfetalis

Early congenital (infantile): Rash and Funisitis (Umbilical Cord Vasculitis), Osteochondritis, Periostitis, Liver and Lung fibrosis

Late congenital (Childhood): Frontal bossing, Short maxilla, High palatal arch,
Hutchinson teeth (Screwdriver), 8th nerve deafness, Saddle nose, Perioral fissures.

Periostitis: Inflammation of the periosteum.

Diagnosis:

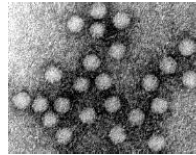
RPR/VDRL: non treponemal test
(RPR) Rapid plasma regain

Treatment:

Penicillin G

PARVOVIRUS P 19

- Viral infection.
- Parvovirus P 19.
- Causative agent of Fifth disease (erythema infectiosum).
- Humans are known hosts
- Spread by the respiratory route, blood & transplacental.



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

Epidemiology:

- Most of the population is eventually infected. (become immune)
- Half of women of childbearing age are susceptible to infection.
- Risk of fetal death highest when infection occurs during the **second trimester of pregnancy (1st 20 weeks of pregnancy)**
 - Infection in the 1st trimester → IUD (Intrauterine death)
 - Infection in the 2nd trimester → HF (Hydrops fetalis)
 - Infection in the 3rd trimester → Lowest risk
- **Minimal risk to the fetus if infection occurred during the third trimesters of pregnancy.**

Clinical Feature:

- 1- Hydrops fetalis.
- 2- Congestive heart failure.
- 3- Generalized oedema.

Diagnosis

Pregnant mother: Specific IgM , IgG seroconversion

Prenatal: Not grow in c/c , PCR , U/S (hydrops)

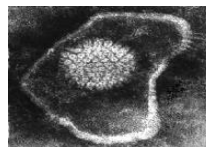
Treatment:

intrauterine transfusions and administration of digoxin to the fetus.

Prevention: Hygiene practice - No vaccine (TRIAL)

NEONATAL VARICELLA Not important

- 90% of pregnant women already immune.
- Primary infection during pregnancy carries a greater risk of severe disease.



d.s DNA , Enveloped ,
Icosahedral Virus

• **Transmission**

- Respiratory droplets
- Direct & Indirect contact
- Transplacental

Clinical Features

- First 20 weeks of Pregnancy.
- Up to 3% chance of transmission to the fetus, recognised congenital varicella syndrome; Scarring of skin, Hypoplasia of limbs, CNS and eye defects.

Diagnosis

Test		Pregnant mother and Fetus	Neonate
Direct form the vesicles	Culture	+	+
	DFA	+	+
	PCR	+	+
		Fetal blood and amniotic fluid	
Serology	IgM	+	+
	Rising IgG	+	
US and MRI		+	

Treatment:

- **Acyclovir** at first signs of varicella pneumonia

Prevention:

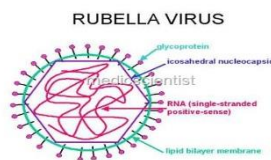
- Pre-exposure; live-attenuated vaccines before or after pregnancy but not during pregnancy.
- Post exposure Zoster immunoglobulin to susceptible pregnant women and infants whose mothers develop varicella during the last **5 days** of pregnancy or the first **2 days** after delivery and premature baby <28 wks of gestation.

RUBELLA

SS RNA enveloped virus, Icosahedral capsid, member of the togaviridae family. Spread by respiratory droplets and transplacentally.

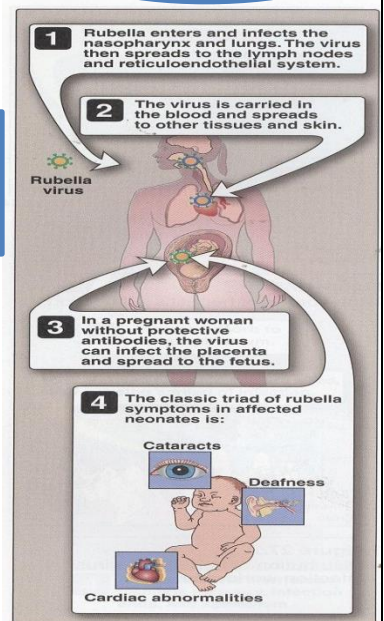
Epidemiology:

- Vaccine-preventable disease.
- No longer considered endemic.
- Mild, self-limiting illness.
- Infection earlier in pregnancy has a higher probability of affecting infant.



SS RNA genome
Icosahedral capsid
Enveloped Virus

pathogenesis



Clinical manifestation:

- **Acquired infection ;**
Ex. Maculopapular rash (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.

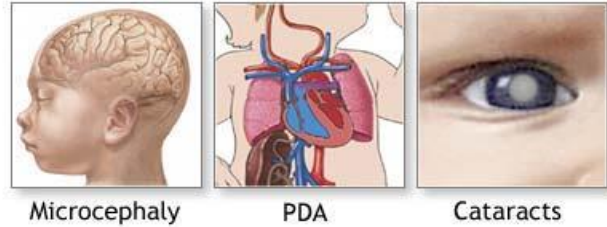
gestational age	risk to fetus
• 0-12 weeks	70%
• 13-16 weeks	20%
• >16 weeks	Infrequent

Clinical Features:

Triad of abnormalities affecting eyes, ears & heart

- **Sensor neural hearing loss (most common).**
- Cataracts, glaucoma.
- Cardiac malformations.
- Neurologic (less common).
- **“Blueberry muffin” lesions.**

Rubella syndrome



Diagnosis:

- Maternal IgG is useless!
- Viral isolation virus from nasal secretions, throat, blood, urine, CSF.
- Serologic testing. IgM = recent postnatal or congenital infection.
- Rising monthly IgG titers suggest congenital infection



Prevention by immunization

CYTOMEGALOVIRUS

It is the most common congenital viral infection ~40,000 infants per year.

Epidemiology:

Human, worldwide.

Transmission:

1- Horizontal transmission:

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

2- Vertical transmission:

10 CMV infection - Recurrent CMV infection.

(~40%) - (~1%)

-Transmission can occur with primary infection or reactivation of virus but 40% risk of transmission in primary infection.

-Increased risk of transmission later in pregnancy but more severe complications associated with earlier acquisition.

Clinical Features:

- 90% are asymptomatic at birth
- Up to 15% develop symptoms later
- Microcephaly, **periventricular calcifications**, neurological deficits, HSM, petechiae, jaundice, chorioretinitis
- >80% develop long term complications: Hearing loss, vision impairment, developmental delay.

Diagnosis:

- **Maternal :**

Serology ; CMV IgM , CMV IgG , CMV IgG avidity

- **Prenatal :**

PCR , culture , CMV specific IgM , **Ultrasound**

- **Postnatal:**

by **isolating CMV** in first 3 weeks of life.

Body fluid : urine, saliva, blood. By :

- Standard tube culture method
- Shell vial assay

- **Histology:**

Detection of Cytomegalic Inclusion

Bodies in affected tissue

- **Serology:** CMV IgM



Intranuclear I B [Owl's -eye]

Viral isolation from urine or saliva in 1st 3 weeks of life.

Treatment:

Ganciclovir x6wks in symptomatic infants

HERPES SIMPLEX

- HSV1 or HSV2
- Primarily transmitted through infected maternal genital tract.
- Primary infection with greater transmission risk than reactivation.
- **Rationale for C-section delivery prior to membrane rupture.**

Clinical presentation:

3 patterns of equal frequency with symptoms between birth and 4wks: Skin, eyes, mouth, CNS disease, **disseminated disease (present earliest).**

Diagnosis

- Culture of maternal lesions if present at delivery
- Cultures in infant
- CSF PCR
- Serologies is useless

Treatment:

High dose of acyclovir.

Summery :

- The clinical features of congenital infections are mostly the following; Intrauterine growth retardation, skin rash, Microcephaly and Hepatosplenomegaly.
- Toxoplasmosis is caused by Toxoplasma gondii and the Definitive host is the domestic cat.
- Toxoplasmosis infection is acquired by the ingestion of cysts (meats, garden products).
- Syphilis is caused by Treponema Pallidum and transmitted by sexual contact.
- Parvovirus P 19 is the causative agent of Fifth disease [Erythema Infectiosum]
- Rubella is an RNA virus and it spreads by respiratory droplets and transplacentally, it can be prevented by vaccination.
- Cytomegalovirus is the most common congenital viral infection
- The rate of transmission of the infection from the mother to the baby is high during the 3rd trimester.
- If the infection occurred in the 1st trimester it will lead to fetal death.

	Summery			
	Presentation	Diagnosis	Treatment	Prevention
Toxoplasmosis	<ol style="list-style-type: none"> 1. Chorioretinitis 2. Hydrocephalus 3. Intracranial calcifications 	<ol style="list-style-type: none"> 1. Serology 2. Fetal tissue culture 3. PCR 	<ol style="list-style-type: none"> 1. Spiramycin 2. Pyrimethamine and sulfadiazine 	-
Syphilis	<p>Fetal: Stillbirth, Neonatal death, Hydrops fetalis</p> <p>Early congenital (infantile): Rash and Funisitis (Umbilical Cord Vasculitis), Osteochondritis, Periostitis, Liver and Lung fibrosis</p> <p>Late congenital (Childhood): Frontal bossing, Short maxilla, High palatal arch, Hutchinson teeth (Screwdriver), 8th nerve deafness, Saddle nose, Perioral fissures.</p>	<ol style="list-style-type: none"> 1. RPR/VDRL: Non-Treponemal test 	<i>Penicillin G</i>	
Parvovirus P19	<ol style="list-style-type: none"> 1. hydrops fetalis 2. congestive heart failure 3. generalized oedema 	<ul style="list-style-type: none"> - Serology - PCR - US - There is NO culture 	<i>Intrauterine digoxin</i>	
Neonatal Varicella	<ol style="list-style-type: none"> 1. Scarring of skin 2. Hypoplasia of limbs 3. CNS and eye defects 	<ol style="list-style-type: none"> 1. Culture 2. PCR 3. Serology 4. US 	<i>Acyclovir at first signs of varicella pneumonia</i>	<p>-Pre-exposure: <i>live-attenuated vaccines</i></p> <p>-Post-exposure: <i>Zoster immunoglobulin</i></p>
Rubella	<ol style="list-style-type: none"> 1. Sensorineural hearing loss 2. Cataracts, glaucoma and cardiac malformations 3. "blueberry muffin" lesions 	<ol style="list-style-type: none"> 1. Viral culture from nasal secretions 2. Serologic testing: IgM 3. PCR 	<i>Supportive care</i>	immunization
Cytomegalo virus	<ol style="list-style-type: none"> 1. Microcephaly 2. <i>periventricular calcifications</i> 3. Hearing loss 	<ol style="list-style-type: none"> 1. Urine and Saliva Culture 2. Urine PCR 3. Serology 	<i>Ganciclovir</i>	
Herpes simplex	Skin, eyes, mouth , CNS disease	<ol style="list-style-type: none"> 1. Culture of maternal lesions 2. CSF PCR 	<i>acyclovir</i>	

Questions :

- 1- a pregnant women was exposed to a cat feces in her 1st trimester, her baby had chorioenteritis, hydrocephalus, and intracranial calcification, what is the diagnosis?
- A. Parvovirus
 - B. Rubella
 - C. Toxoplasmosis
- 2- which one of the following treatment is recommended in case of genital herpes infection:
- A. Acyclovir
 - B. Penicillin G
 - C. Spiramycin
- 3- The rate of transmission of the infection from the mother to the baby is high during the:
- A. 1st trimester.
 - B. 2nd trimester.
 - C. 3rd trimester.

Answers: C, A, C