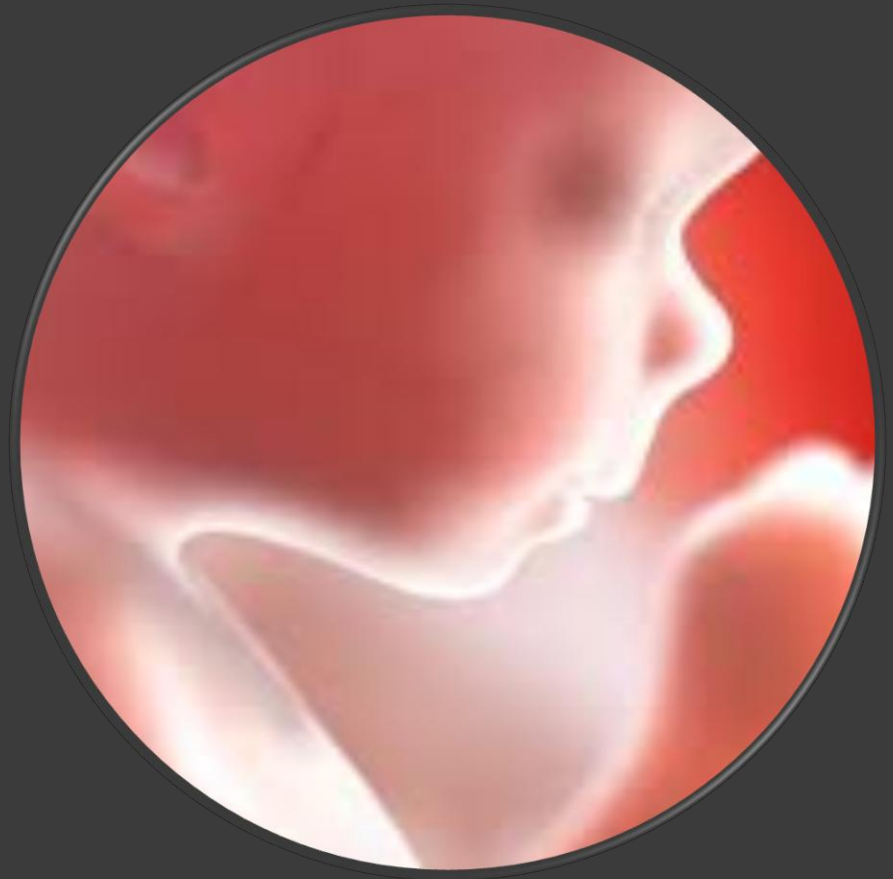


Infectious diseases

Infections in pregnancy



Assoc. Prof. Dr Biljana Popovska Jovicic

Infections in pregnancy

- Infection during pregnancy, regardless of the etiological cause, can pose a risk to the course of pregnancy and the fetus
- Infection of the fetus can occur:
- During pregnancy (prenatal, intrauterine or congenital infection)
- During childbirth (perinatal infection)
- After childbirth (postnatal infection)



Routes of infection spread

Prenatal infection

- Hematogenous
- Ascending
- *Per contuitatem*

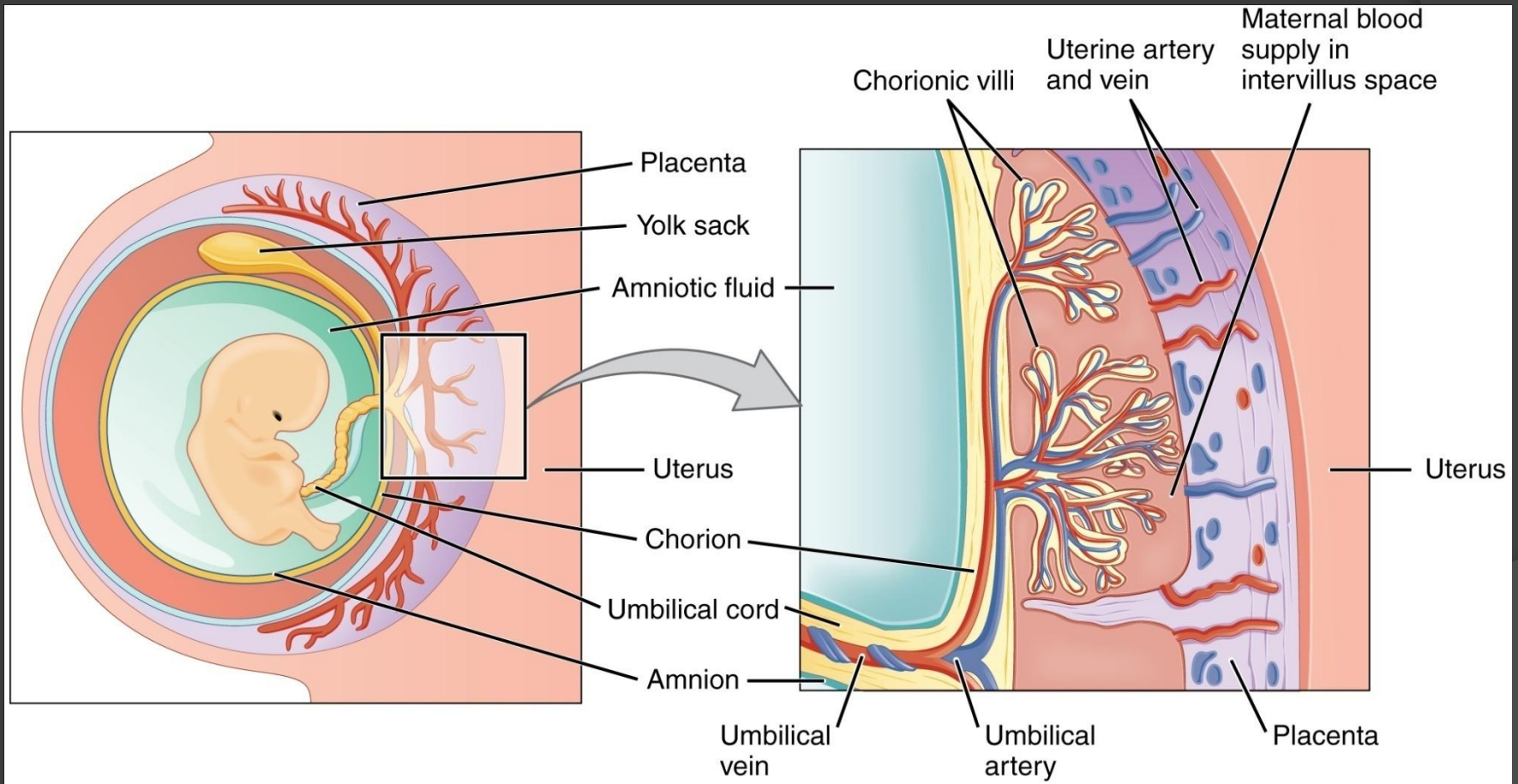
Perinatal infection

- During childbirth genital

Postnatal infection

- By breastfeeding
- People in the environment

Components of the ovum in a pregnant woman



Factors influencing the onset of infection

- ⦿ Fetal maturity at the time of infection
 - ⦿ Immune status of the pregnant woman
 - ⦿ Preservation of the placenta, i.e. the ovum
 - ⦿ Type, number and virulence of microorganisms
-
- ⦿ Predisposing factor: physiological immunodeficiency of the fetus

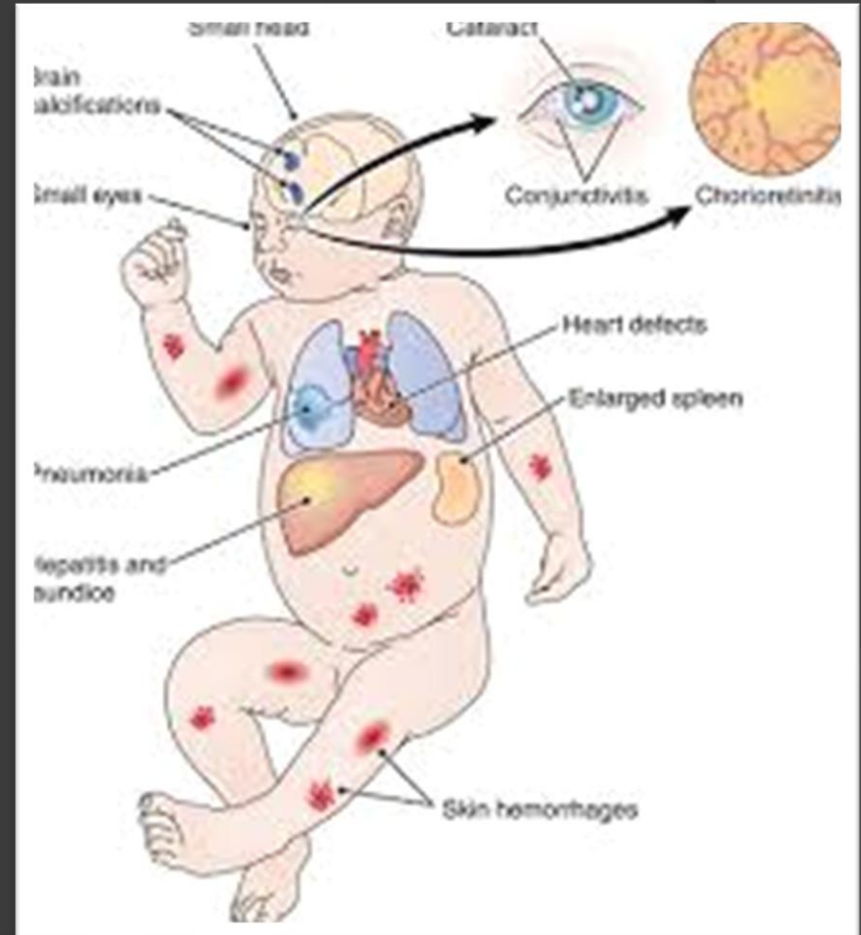
Consequences of infections during pregnancy on the fetus

- ✓ Spontaneous abortion
- ✓ Intrauterine fetal death
- ✓ Premature birth
- ✓ Birth of a child with congenital malformations
- ✓ Birth of a child with systemic infections
- ✓ Birth of a child with low birth weight
- ✓ Birth of a healthy child

Etiological causes of infections in pregnancy

| Viruses | Bacteria |
|-----------------------------|--------------------------|
| <u>Rubella</u> | Listeria monocytogenes |
| <u>Cytomegalovirus</u> | Streptococcus grupe B |
| <u>Herpes simplex virus</u> | Treponema pallidum |
| Varicella zoster virus | Chlamydia |
| Parvo B 19 | Spirohete |
| Coxsackie i echovirusi | Protozoa |
| HIV virus | <u>Toxoplasma gondii</u> |
| Hepatitis C virus | Plasmodium |
| Hepatitis B virus | |
| Papilloma virus | |

- Clinical presentation depends on the time of infection during pregnancy
- Clinical symptoms are often nonspecific
- Different pathogens produce similar clinical presentations
- Clinical presentation similar to other conditions of noninfectious etiology
- Rapid etiological diagnosis essential



TORCH syndrome

Medical acronym for disseminated
intrauterine infection syndrome.

Toxoplasma gondii_____

OTHER INFECTION (druge infekcije): VZV, Parvo B19,
Syphylis., Listeria...

Rubella virus_____

Cytomegalovirus_____

Herpes symplex_____



Diagnostics of intrauterine infections (prenatal and postnatal)

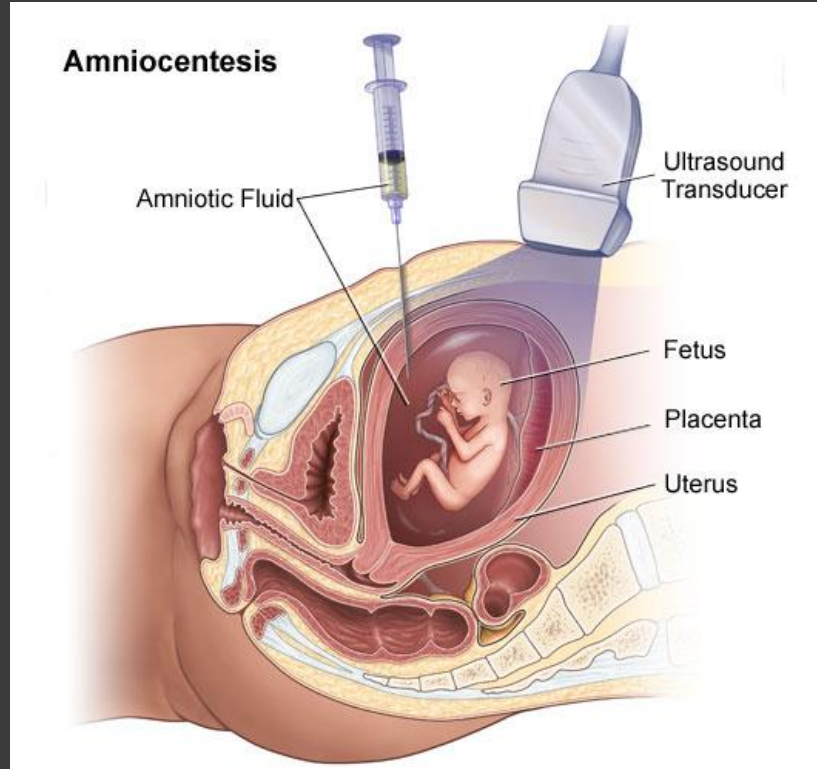
Laboratory diagnostics:

- ◉ Isolation on tissue culture
- ◉ Bacteriological analyses (cultures)
- ◉ Serological methods (ELISA, Ag detection)
- ◉ Polymerase chain reaction (PCR)

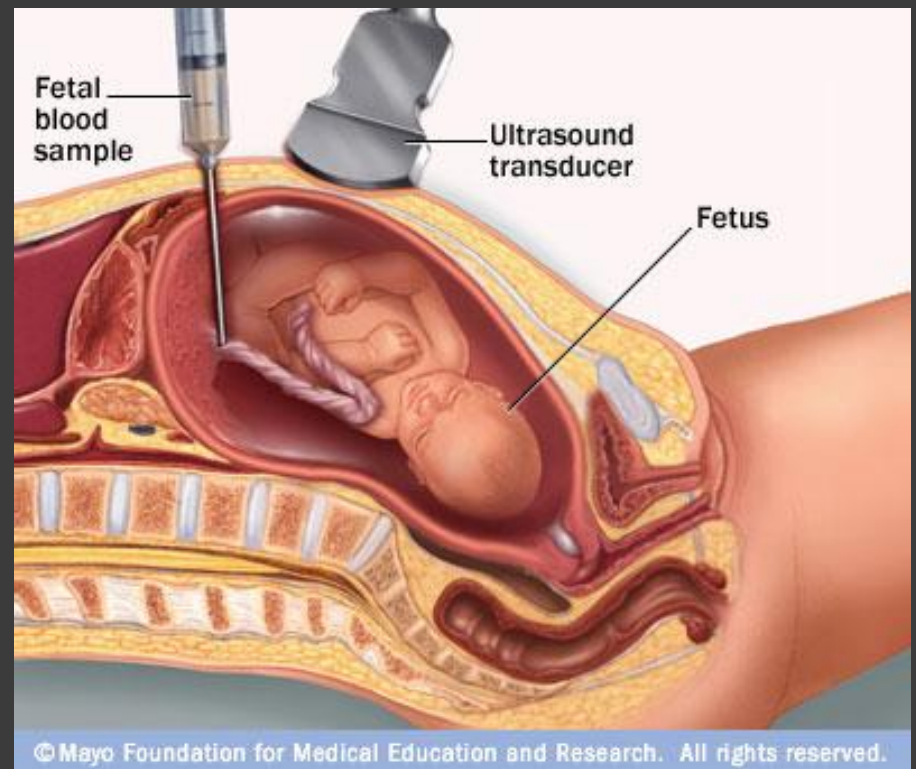
Methods used in prenatal diagnosis:

- ◉ Amniocentesis
- ◉ Cordocentesis
- ◉ Chorionic villus biopsy

Methods used in prenatal diagnosis



Amniocentesis



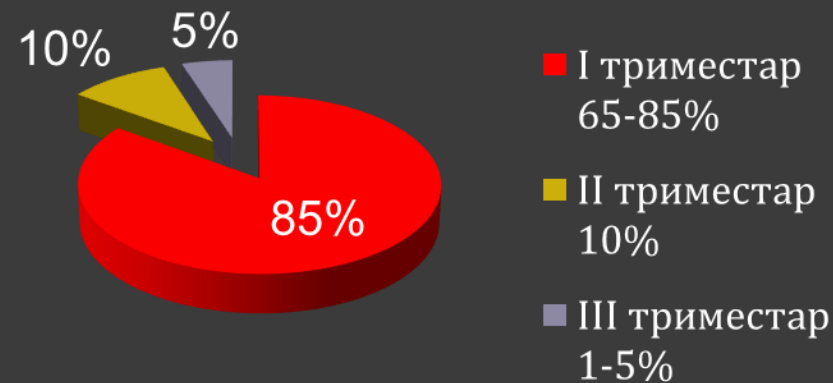
Cordocentesis

Viral infections in pregnancy

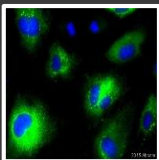
Rubella

- Rubella virus belongs to Togaviridae
- Hematogenous-transplacental transmission
- Infection of seronegative pregnant woman
- Asymptomatic or mild disease in pregnant woman

Развој конгениталних аномалија у односу на старост трудноће

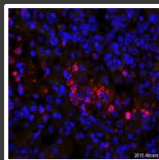


Transient



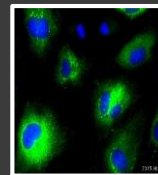
- Low birth weight
- Thrombocytopenia
- Meningoencephalitis
- Hepatosplenomegaly
- Jaundice

Permanent



- Microcephaly
- Deafness
- Cataracts and microphthalmia
- Heart defects (ductus arteriosus, pulmonary stenosis, ventricular septal defect)

Developmental



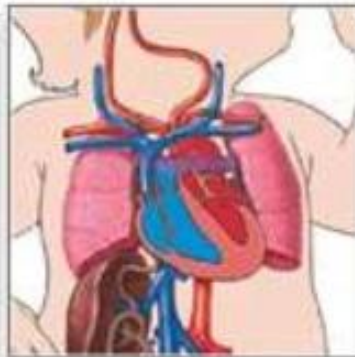
- Diabetes mellitus
- Thyroid damage
- Epilepsy
- Епилепсија
- Degenerative brain disease

Congenital Rubella Syndrome

Rubella syndrome



Microcephaly



PDA



Cataracts

Diagnosis and treatment of rubella

- ⦿ Virus isolation – amniotic fluid, nasopharynx, urine, cerebrospinal fluid
- ⦿ Serological diagnostics – ELISA, detection of IgM antibodies, or fourfold increase in IgG antibodies
- ⦿ Polymerization chain reaction PCR
- ⦿ Methods – cordocentesis, chorionic villus sampling
- ⦿ Treatment is symptomatic
- ⦿ Prevention – live attenuated MMR vaccine

Cytomegalovirus

- ❑ DNA virus, belongs to the Herpesviridae family

Maternal infection can be:

- ✓ primary infection (30-50%)
- ✓ reinfection (1-2%)

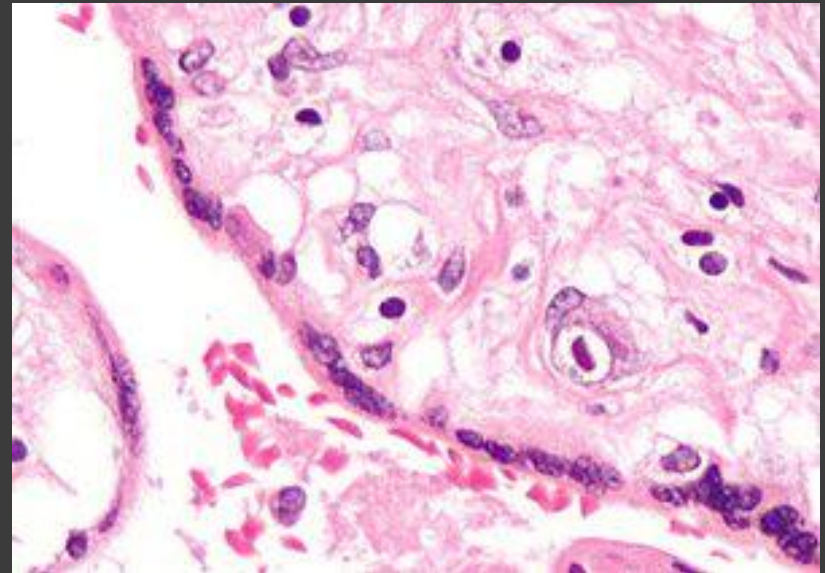
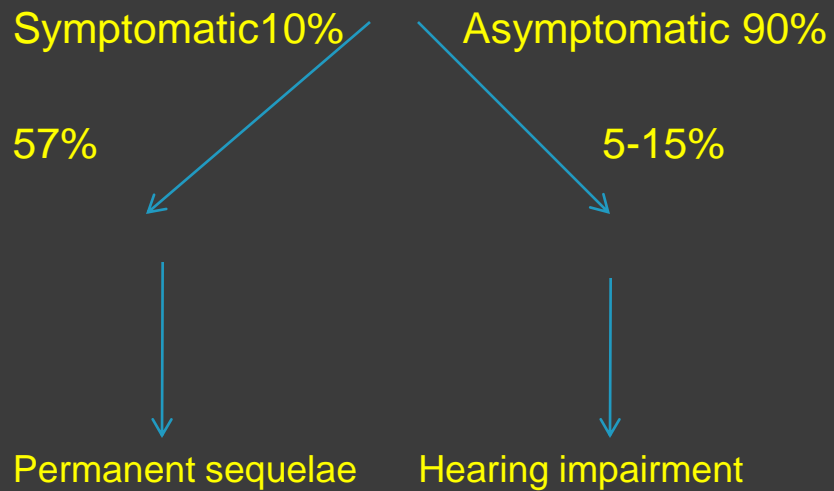
Pathways of infection spread:

- ✓ Transplacental
- ✓ During childbirth
- ✓ Breastfeeding

Virus excretion in infected newborns can last for months or even years, and the virus can be isolated from urine, blood, tears...

Cytomegalovirosis

CMV infection



CMV placentitis

Cytomegalovirus

Symptomatic disease:

(at birth)

Hepatosplenomegaly,

Jaundice

Petechiae,

Chorioretinitis, Microcephaly

Permanent sequelae:

Intracranial calcifications, hearing
impairment,
blindness,
neurological disorders, psychomotor
retardation

,

Diagnosis of CMV infection

◉ Laboratory diagnostics

- Virus isolation (amniotic fluid, blood, cerebrospinal fluid, urine)
- Polymerization chain reaction (PCR)
- Serological analyses (ELISA, IgM antibodies, or fourfold increase in IgG)
- Pathohistological findings - inclusion bodies

◉ Methods in prenatal diagnostics

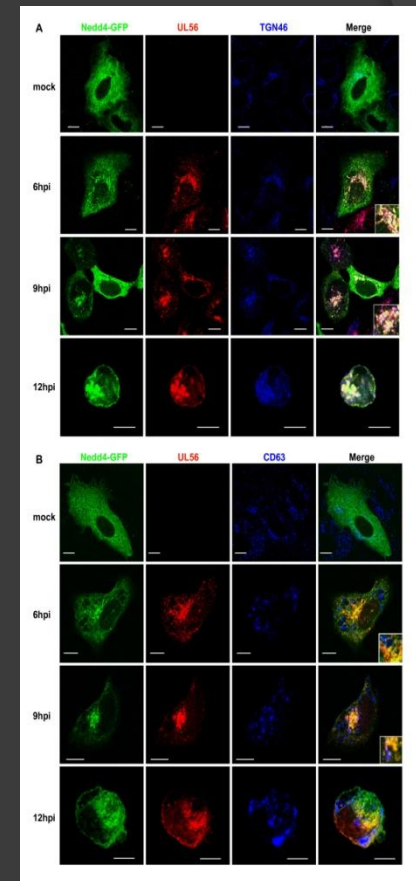
Treatment and prevention

- Therapy-symptomatic
- In newborns with symptomatic infection at birth, antiviral therapy (Ganciclovir) may have a favorable effect on the outcome
- Prevention in pregnant women- personal hygiene, washing hands with soap and water, avoiding sharing food, drinks with young children (contact with saliva)



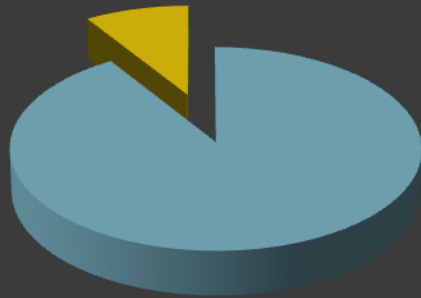
Infection with herpes viruses

- HSV-1, HSV-2 belong to the Herpesviridae family
- HSV-2 is by far the most common cause of infection (90%)
- Infection occurs through passage through an infected birth canal of the mother
- Neonatal herpes infection



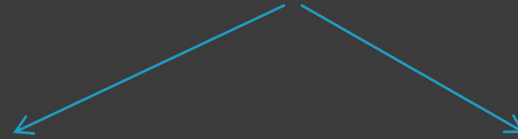
Neonatal herpes infection

HSV-2



- примарна инфекција
- Рекурентна инфекција

◎ Неонатална HSV инфекција



Локализована

Очи
Усна дупља
Кожа

Дисеминована

Иктерус
Хепатоспленомегалија
Хеморагична дијатеза
Енцефалитис

✓The mortality rate for untreated disseminated infection is 85%, and permanent sequelae is 50%.

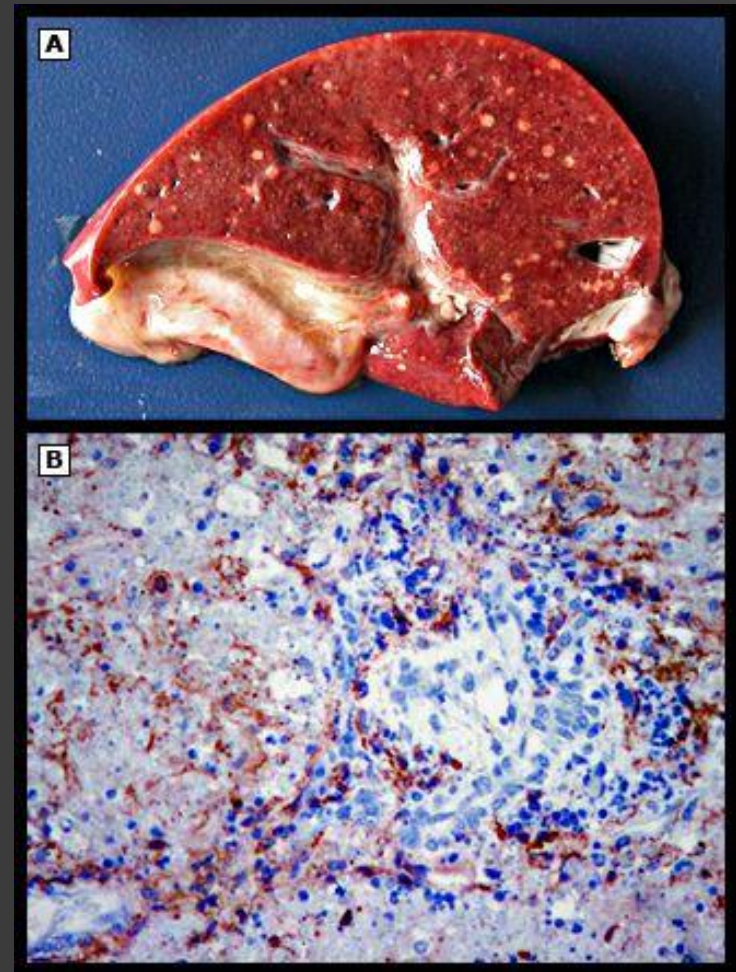
Congenital herpes infection

- ❑ Causative agents HSV-1 and HSV-2, predominantly in primary infection
- ✓ Very rare in contrast to neonatal infection
- ✓ Transplacental transmission
- ❑ Possible outcomes:
 - ✓ Growth failure
 - ✓ Premature birth
 - ✓ Miscarriage
 - ✓ Stillbirth
 - ✓ Congenital malformations
- ❑ Congenital malformations
 - ✓ Intracranial calcifications
 - ✓ Microcephaly
 - ✓ Microphthalmia
 - ✓ Mental retardation
 - ✓ Retinal dysplasia



Source: Newborn Infant Nurs Rev © 2004 W.B. Saunders

Vesicular skin changes in disseminated HSV infection



Liver in disseminated HSV infection and histological findings

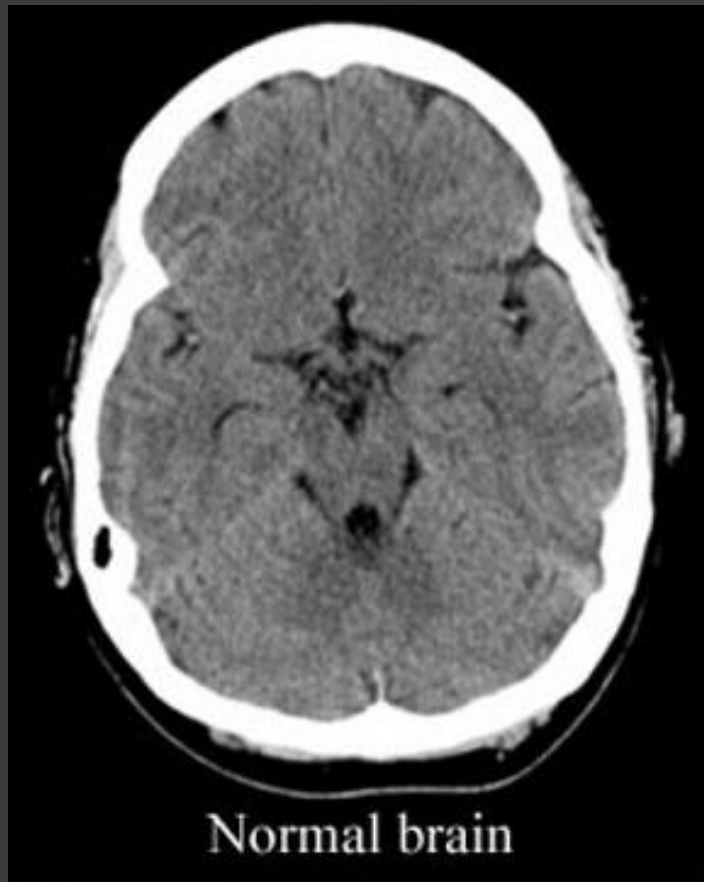


Figure 1

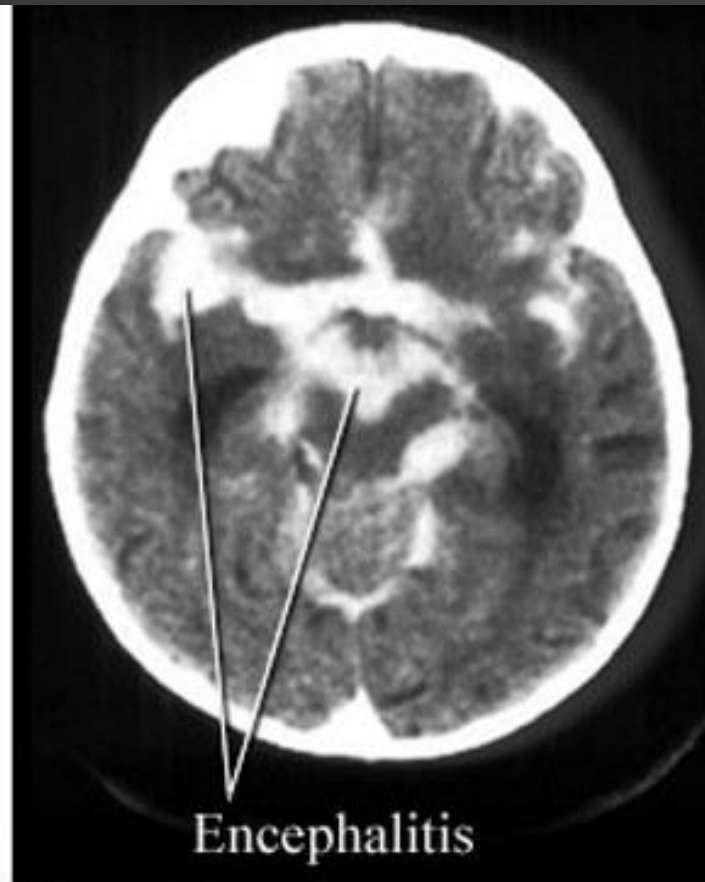


Figure 2

NMR in a healthy newborn (left) and in a newborn with HSV encephalitis (right) as part of disseminated infection

Diagnosis

- ⦿ Physical examination
- ⦿ Virus isolation (pharyngeal swab, tracheal aspirate, eye swab...)
- ⦿ Polymerization chain reaction (PCR) - cerebrospinal fluid, blood, mucocutaneous lesions...)
- ⦿ Direct immunofluorescence
- ⦿ Serological tests (ELISA)
- ⦿ **Methods in prenatal diagnosis**

Treatment of herpes infections

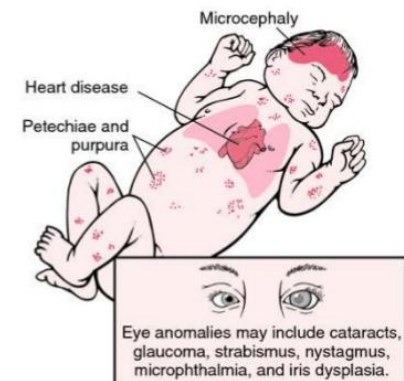
- Treatment of disseminated HSV infection with Acyclovir, 20 mg/kg, every 8 hours, intravenously, for at least 14-21 days
- Prevention
- Treat symptomatic HSV infection in pregnant women with Acyclovir
- Cesarean section for primary or recurrent infection with fresh vesicular lesions

Varicella

- ❑ Causative agent – Varicella - Zoster virus belongs to the Herpesviridae family
- ✓ Transplacental-hematogenous transmission
Seronegative pregnant women

- ⦿ Severe sequelae in the first 16 weeks of pregnancy:

- Limb hypoplasia or aplasia
- Microcephaly
- Hydrocephalus
- Mental retardation
- Optic nerve atrophy



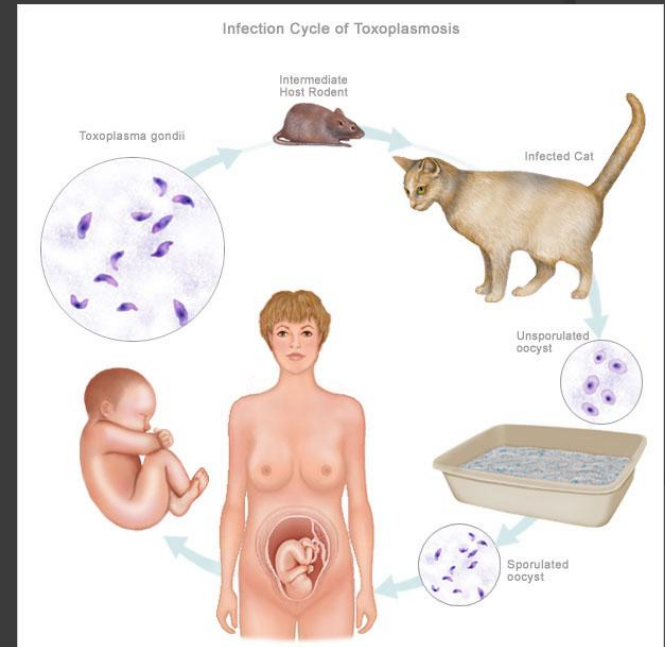
- A special problem is neonatal VZV infection
- Occurs if the mother becomes ill 5 days before or 2 days after delivery
- Disseminated infection, affects the skin, eyes, lungs, liver and CNS
- Diagnosis - prenatal diagnostics, virus isolation, PCR, antibodies to VZV
- Acyclovir 10-15 mg/kg i.v 8 hours 10 days



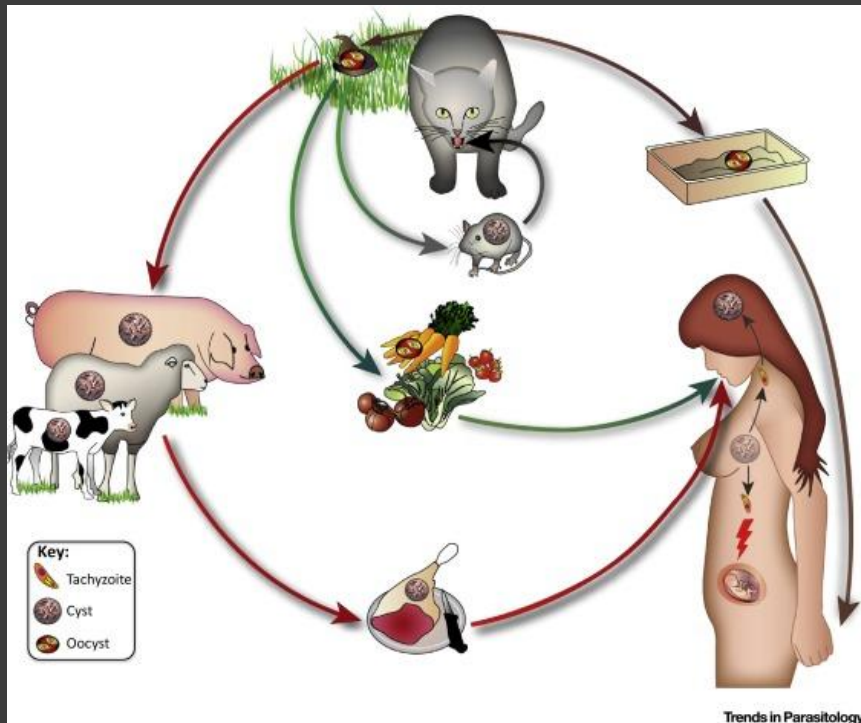
Parasitic infections in pregnancy

● TOXOPLASMOSIS

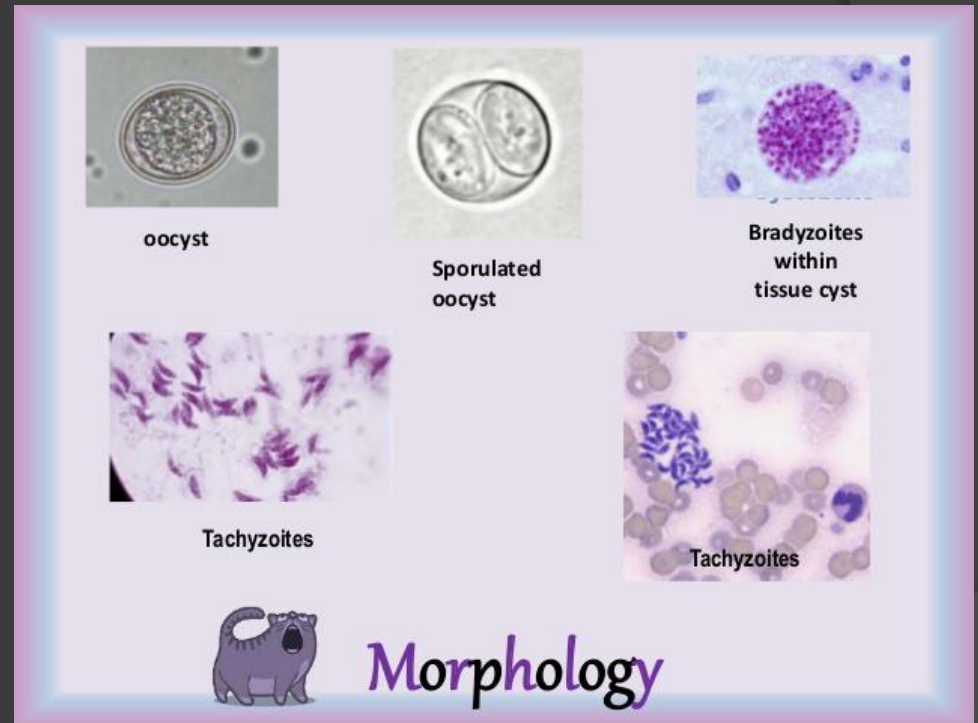
- Causative agent - Protozoan, *Toxoplasma gondii*
- Feco-oral infection
- Seronegative pregnant women, infection occurs during primary infection
- Maternal infection usually mild disease
- Transplacental transmission
- Hematogenous spread of tachyzoites



Life cycle of *Toxoplasma gondii* and morphological forms



Life cycle of *Toxoplasma gondii*



Life cycle of *Toxoplasma gondii*

Clinical manifestations of Toxoplasmosis in pregnancy

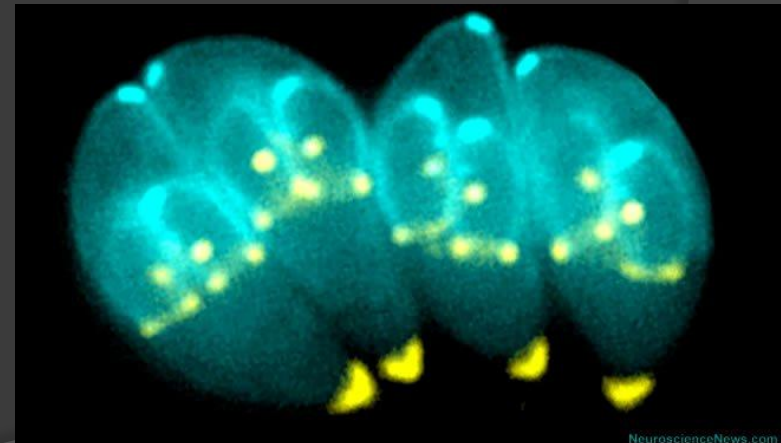
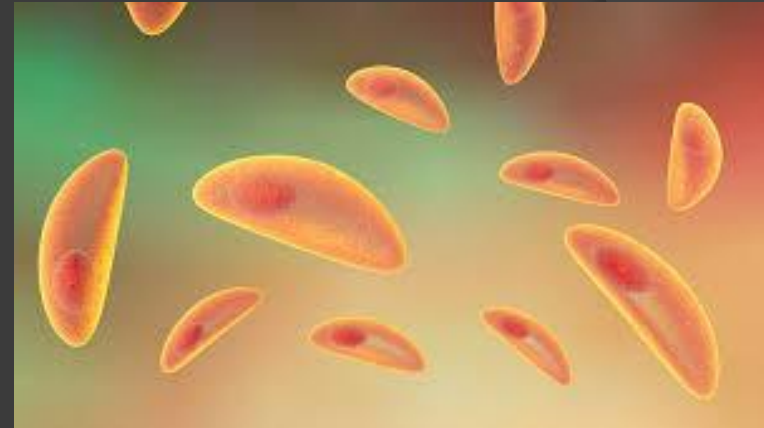
I trimester: miscarriage, fetal death, stillbirth, congenital defects (hydrocephalus, microcephaly, visual impairment, psychomotor retardation)

II and III semester: children are usually healthy 70-90%, in other children signs of generalized infection (hepatosplenomegaly, encephalitis, jaundice, anemia...)

A small number of children develop late manifestations in the form of severe brain and vision damage

Diagnosis

- Polymerase chain reaction (PCR DNA)
- Serological tests: ELISA (IgM, or fourfold increase in IgG)
- Parasite isolation by biological assay by inoculation of amniotic fluid in mice
- Prenatal diagnostic methods (amniocentesis, cordocentesis)



Therapy

- ❑ Congenital toxoplasmosis - combination therapy:
Pyrimethamine 0.5-1mg/kg and Sulfadiazine (100mg/kg)
- ❑ Folic acid supplementation
- ❑ Treatment is intermittent and lasts for a year
- ❑ Corticosteroid therapy: for progressive encephalitis and chorioretinitis
- ❑ For subclinical forms and acute infection of pregnant women - Spiramicin for 30 days

Prevention

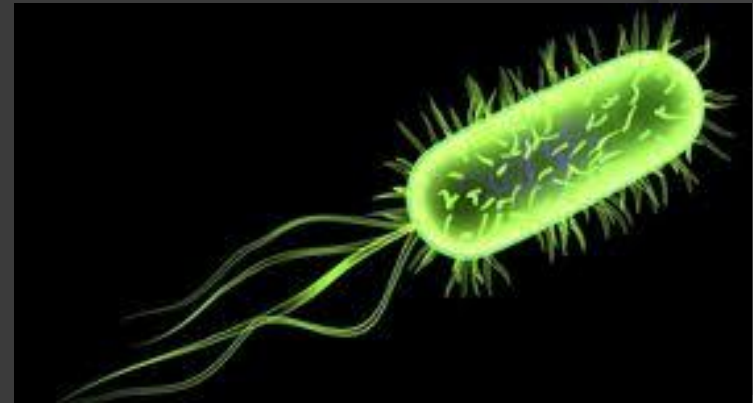
- Implementing personal hygiene measures
- Avoid contact with cats, especially their excretions during pregnancy
- Wash hands thoroughly after gardening
- Wash fruits and vegetables thoroughly
- Cook meat thoroughly
- Do not consume water whose quality has not been checked



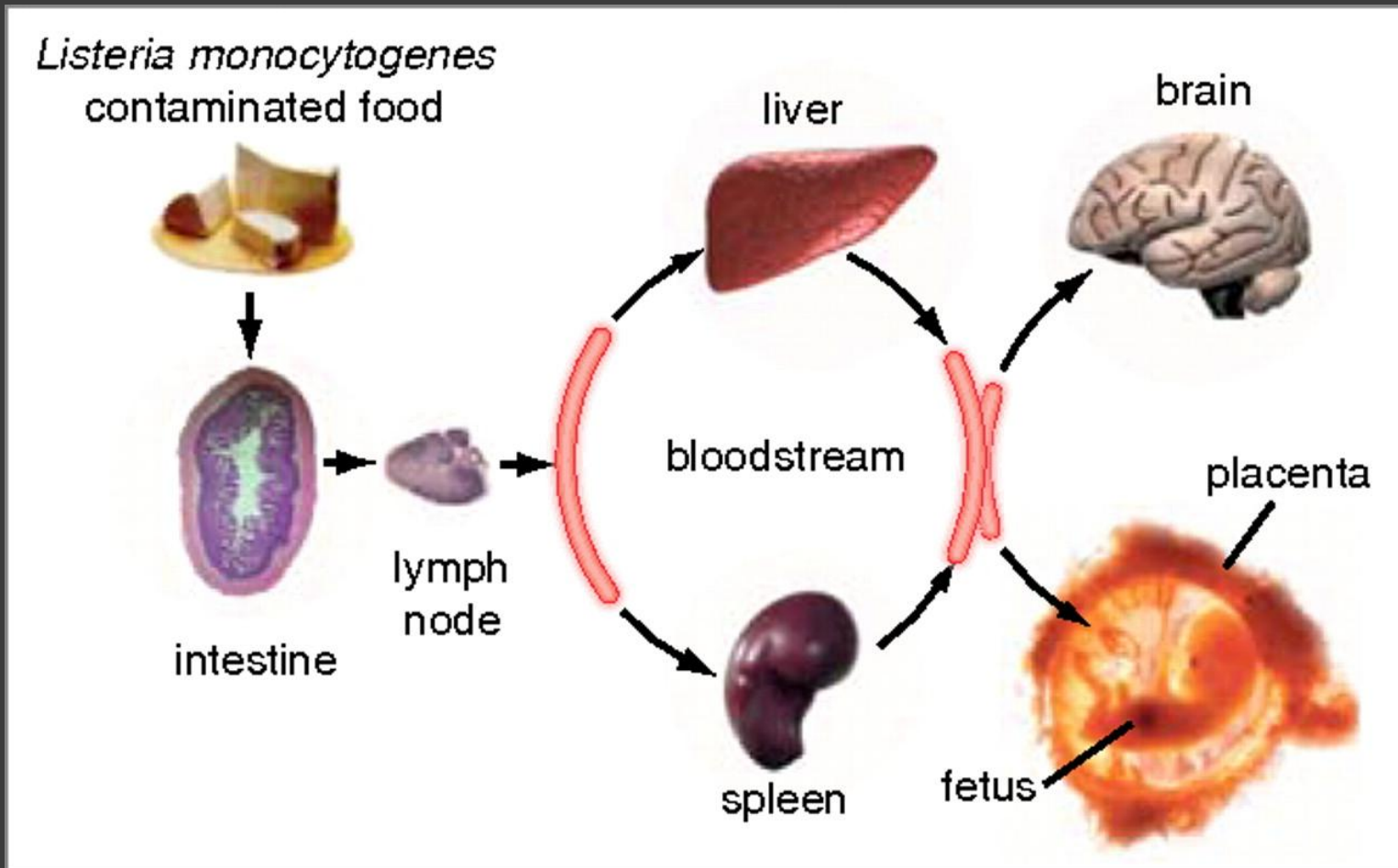
Bacterial infections in pregnancy

Listeriosis

- ✓ *Listeria monocytogenes*, gram-positive rod, intracellular parasite
- ✓ Fecal-oral infection of the mother, ingestion of contaminated water or food
- ✓ Asymptomatic maternal infection or flu-like syndrome
- ✓ **Fetal infection: transplacental transmission or during passage through an infected birth canal**



Pathogenesis of listeriosis



*Congenital infection with *Listeria monocytogenes**

- ❑ Consequences of intrauterine infection on the fetus:
 - ✓ Abortion
 - ✓ Intrauterine fetal death
 - ✓ Stillbirth
 - ✓ Premature birth of an infected child

Neonatal infection with *Listeria monocytogenes*

- ⦿ Transplacental transmission in the third trimester or during passage through the birth canal
- ⦿ **Granulomatosis infrantiseptica**- severe form of miliary disease, mortality 90%, survivors often have sequelae
- ⦿ **Early neonatal sepsis**- indistinguishable from sepsis caused by other pathogens, generally not manifested by meningitis, survivors rarely have neurological sequelae,
- ⦿ **Late neonatal sepsis**- occurs after infection in the birth canal, manifests in the third week and meningoencephalitis is common

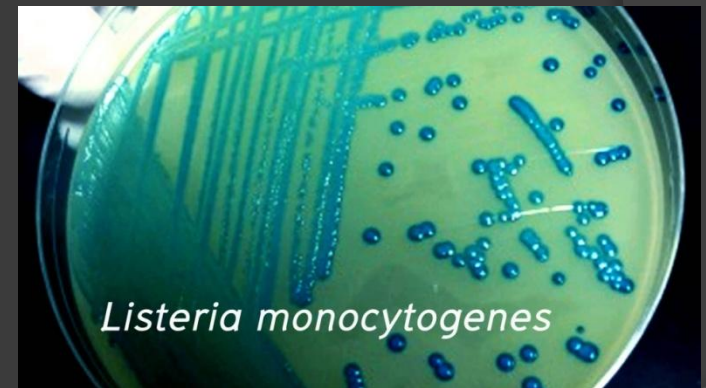
Diagnosis and treatment of listeriosis

❑ Diagnosis

- Culture - cerebrospinal fluid, blood, throat swab, urine, Gram-stained meconium smear
- Serological diagnostics - agglutination, detection of antibodies to listeriolysin O

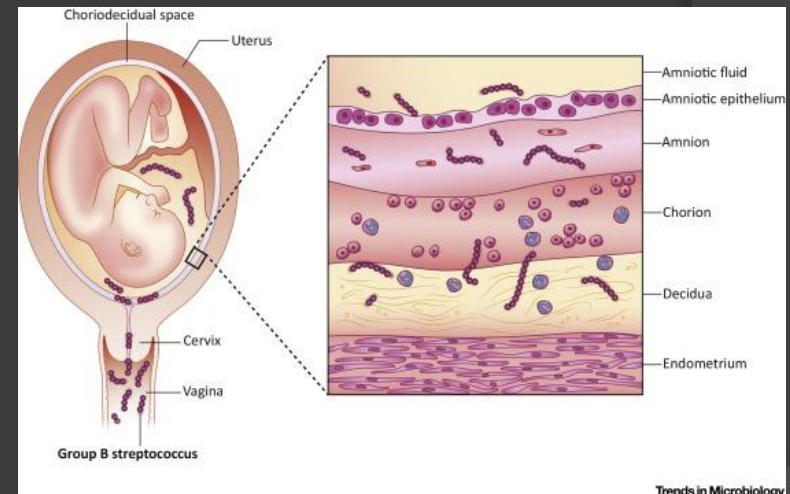
❑ Therapy

- ✓ Ampicillin or Penicillin with Aminoglycosides for bactericidal action
- ✓ In allergic Cotrimoxazole

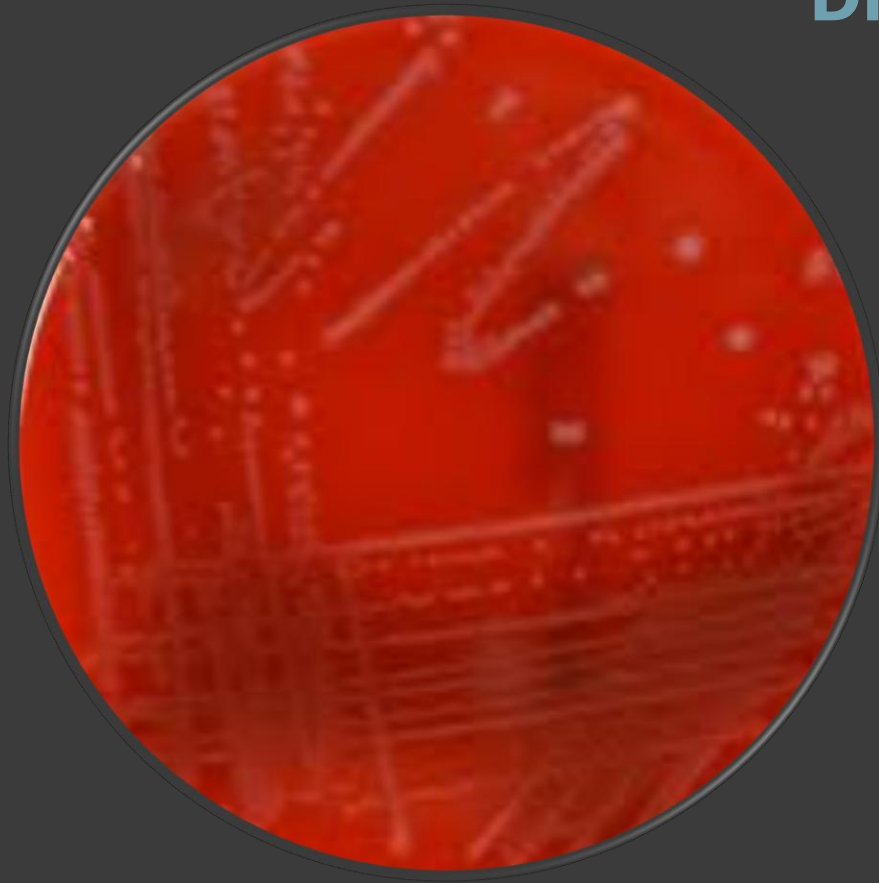


Perinatal infection with group B streptococcus

- Caused by group B beta-hemolytic streptococcus
- Colonization of the vagina or urethra of a pregnant woman,
- Infection of the pregnant woman: endometritis, urinary tract infection, sepsis, meningitis, abdominal abscess
- Illness of the newborn: first seven days after birth, respiratory distress, sepsis, meningitis, skin pustules



Diagnosis and therapy



✓ **Diagnosis** - bacterial culture from blood, cerebrospinal fluid, urine, endotracheal aspirate

✓ **Therapy** - Penicillin G, Ampicillin, Gentamicin



Thank you for your
attention!