

INFECTIOUS DISEASES IN PREGNANCY

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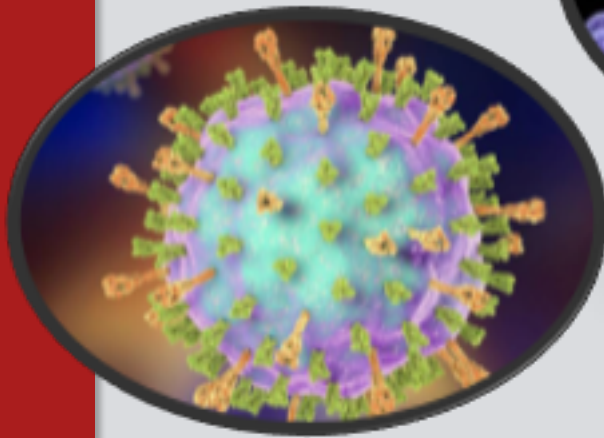
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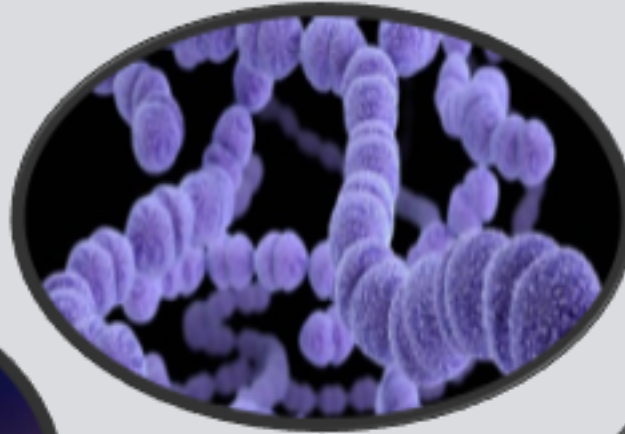
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- Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, Casey BM, Sheffield JS (eds). William's Obstetrics 24th edition; 2014; chapter 64 INFECTIOUS DISEASES

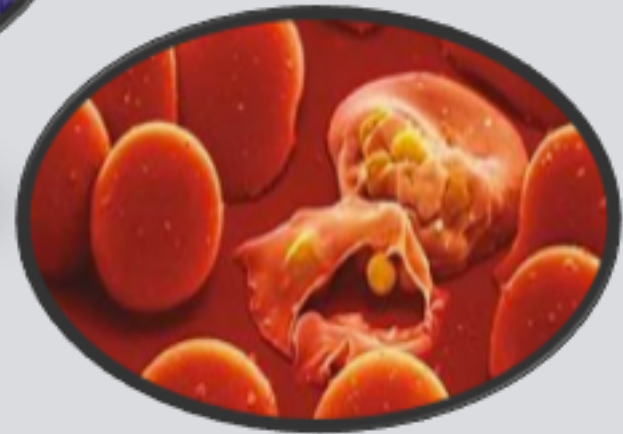
OUTLINE



Viral infections



Bacterial infections



Protozoal infections

PREGNANCY- INDUCED IMMUNOLOGIC CHANGES

- **"Th2 bias in pregnancy"**

- pregnancy is associated with an increase in CD4-positive T cells secreting 2-type cytokines and Th1-type cytokine production appears to be somewhat suppressed
- this bias affects the ability to rapidly eliminate certain intracellular pathogen during pregnancy

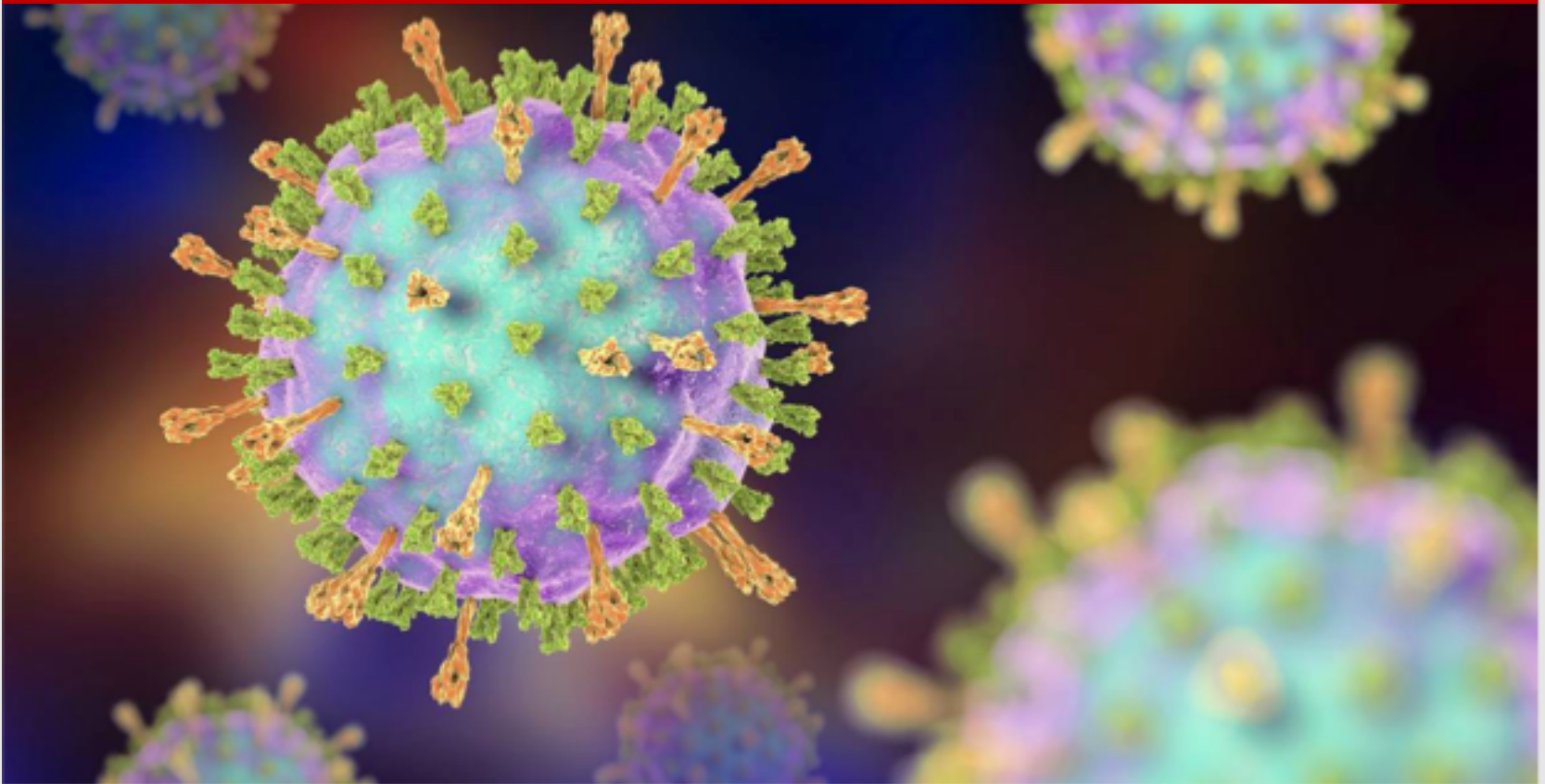
FETAL AND NEWBORN IMMUNOLOGY

- primary fetal response to infection is **immunoglobulin M (IgM)**.
- Passive immunity is provided by **IgG** transferred across the placenta. By 26 weeks, fetal concentrations are equivalent to those of the mother.
- After birth, **breast feeding** is protective against some infections, although this protection begins to decline at 2 months of age.
- World Health Organization (2013) recommendation: exclusively breast feed for the 1st 6 months of life with partial breast feeding until 2 years of age.

FETAL AND NEWBORN IMMUNOLOGY

- **Vertical transmission** refers to passage from the mother to her fetus of an infectious agent through the placenta, during labor or delivery, or by breast feeding.
- preterm rupture of membranes, prolonged labor, and obstetrical manipulations may increase the risk of neonatal infection.
- Neonatal infections occurring **less than 72 hours after delivery** are usually caused by bacteria acquired in-utero or during delivery

Viral infections



Varicella-Zoster Virus ("chicken pox")



Picture of Varicella Chickenpox



- double- stranded DNA herpes virus acquired predominately during childhood
- Primary infection is transmitted by direct contact with an infected individual, although respiratory transmission has been reported.
- incubation period is **10 to 21 days**, and a nonimmune woman has a 60- to 95-percent risk of becoming infected after exposure → contagious from 1 day before the onset of the rash until the lesions are crusted over.
- Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, Casey BM, Sheffield JS (eds). William's Obstetrics 24th edition; 2014; chapter 64 INFECTIOUS DISEASES

Varicella-Zoster Virus: Maternal Infection

- Primary varicella infection presents with a 1- to 2-day flu-like prodrome, followed by pruritic vesicular lesions that crust over in 3 to 7 days.
 - Mortality is predominately due to varicella pneumonia, which is thought to be more severe during adulthood and particularly in pregnancy.
 - Risk factors for VZV pneumonia include smoking and having more than 100 cutaneous lesions.
 - Symptoms of pneumonia usually appear 3 to 5 days into the course of illness. It is characterized by fever, tachypnea, dry cough, dyspnea, and pleuritic pain.
 - If primary varicella infection is reactivated years later, it causes herpes zoster or shingles → presents as a unilateral dermatomal vesicular eruption associated with severe pain..
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Varicella-Zoster Virus: Fetal and neonatal Infection

- first half of pregnancy: fetus may develop **congenital varicella syndrome**.
 - chorioretinitis, microphthalmia, cerebral cortical atrophy, growth restriction, hydronephrosis, limb hypoplasia, and cicatricial skin lesions
- When maternal infection developed before 13 weeks, only **0.4 percent** of neonates developed congenital varicella.



FIGURE 64-1 Atrophy of the lower extremity with bony defects and scarring in a fetus infected during the first trimester by varicella. (From Paryani, 1986, with permission.)

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Varicella-Zoster Virus: Fetal and neonatal Infection



- highest risk is between 13 and 20 weeks → 2% of neonates develop congenital varicella.
- After 20 weeks' gestation → low risk for congenital varicella
- If the fetus or neonate is exposed to active infection just before or during delivery, and therefore before maternal antibody has been formed → serious threat to newborns.
- neonates develop disseminated visceral and central nervous system disease, which is commonly fatal.
- varicella-zoster immune globulin should be administered to neonates born to mothers who have clinical evidence of varicella 5 days before and up to 2 days after delivery.

Varicella-Zoster Virus: Diagnosis

- Maternal varicella infection is usually diagnosed clinically.
- virus may also be isolated by scraping the vesicle base during primary infection and performing a **Tzanck smear**, tissue culture, or direct fluorescent antibody testing.
- nucleic acid amplification tests (NAATs) are very sensitive.
- Congenital varicella may be diagnosed using NAAT analysis of amnionic fluid
- A detailed anatomical sonographic evaluation performed **at least 5 weeks** after maternal infection may disclose abnormalities in the neonate
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Varicella-Zoster Virus: Management

- exposed pregnant women with a negative history for chicken pox should undergo VZV serologic testing.
- Exposed pregnant women who are susceptible should be given VariZIG, a recently approved varicella zoster immune globulin
→ Although best given within 96 hours of exposure, its use is approved for up to 10 days to prevent or attenuate varicella infection



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Varicella-Zoster Virus: Management

- attenuated live-virus vaccine—
Varivax— was approved in 1995.
- Two doses, given 4 to 8 weeks apart,
are recommended for adolescents and
adults with no history of varicella.
- the vaccine is not recommended for
pregnant women or for those who
may become pregnant within a month
following each vaccine dose.
- the attenuated vaccine virus is not
secreted in breast milk, thus,
postpartum vaccination should not be
delayed because of breast feeding



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Influenza



- respiratory infections caused by members of the family Orthomyxoviridae.
- Influenza A and B form one genus of these RNA viruses, and both cause epidemic human disease.
- Influenza A viruses are subclassified further by hemagglutinin (H) and neuraminidase (N) surface antigens.

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Influenza: Maternal and Fetal Infection

- fever, dry cough, and systemic symptoms.
 - Infection usually is not life-threatening in otherwise healthy adults, but pregnant women appear to be more susceptible to serious complications, particularly pulmonary involvement
 - No evidence that influenza A virus causes congenital malformations
 - Influenza may be detected in nasopharyngeal swabs using viral antigen rapid detection assays
 - Reverse transcriptase–polymerase chain reaction (RT-PCR) is the more sensitive and specific test, although not commercially available in many hospitals
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Influenza: Management

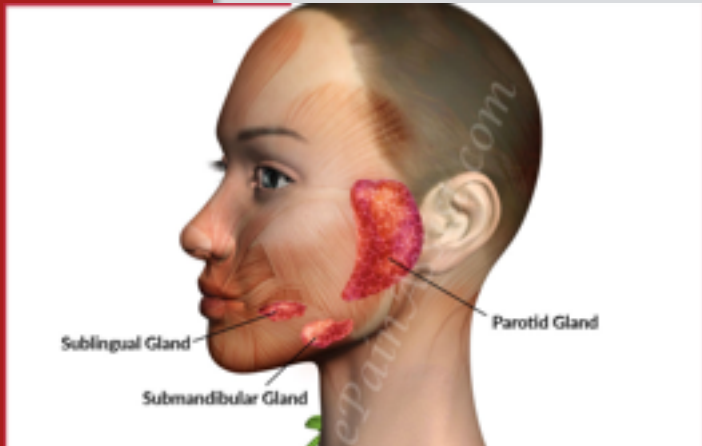
- Two classes of antiviral medications are currently available.
 - **Neuraminidase inhibitors** are highly effective for the treatment of early influenza A and B.
 - include oseltamivir (Tamiflu), which is taken orally for treatment and for chemoprophylaxis, and zanamivir (Relenza), which is inhaled for treatment. Peramivir is an investigational drug administered intravenously.
 - **adamantanes** include amantadine and rimantadine, which were used for years for treatment and chemoprophylaxis of influenza A.
 - For pregnant women: start oseltamivir treatment within 48 hours of symptom onset—75 mg orally twice daily for 5 days.
 - Prophylaxis with oseltamivir, 75 mg orally once daily for 10 days, is also recommended for significant exposures.
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Influenza: Vaccination

- Vaccination against influenza throughout the influenza season, but optimally in October or November, is recommended for all women who will be pregnant during the influenza season.
- this is especially important for those affected by chronic medical disorders such as diabetes, heart disease, asthma, or human immunodeficiency virus (HIV) infection
- there is no evidence of teratogenicity or other adverse maternal or fetal events with vaccination
- studies have found decreased rates of influenza in infants up to 6 months of age whose mothers were vaccinated during pregnancy
- A live attenuated influenza virus vaccine is available for intranasal use but is not recommended for pregnant women.

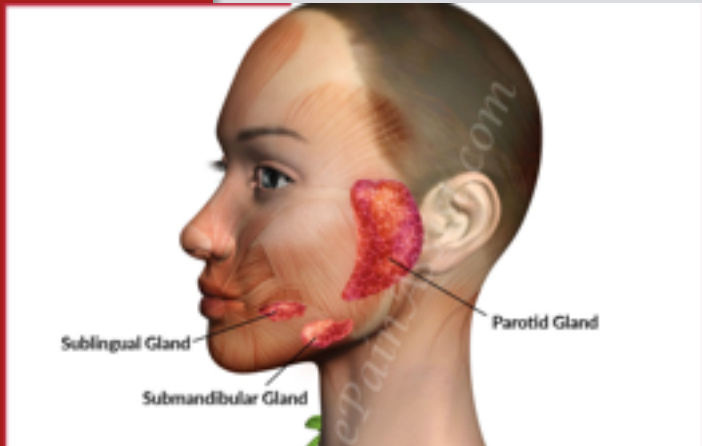
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Mumps



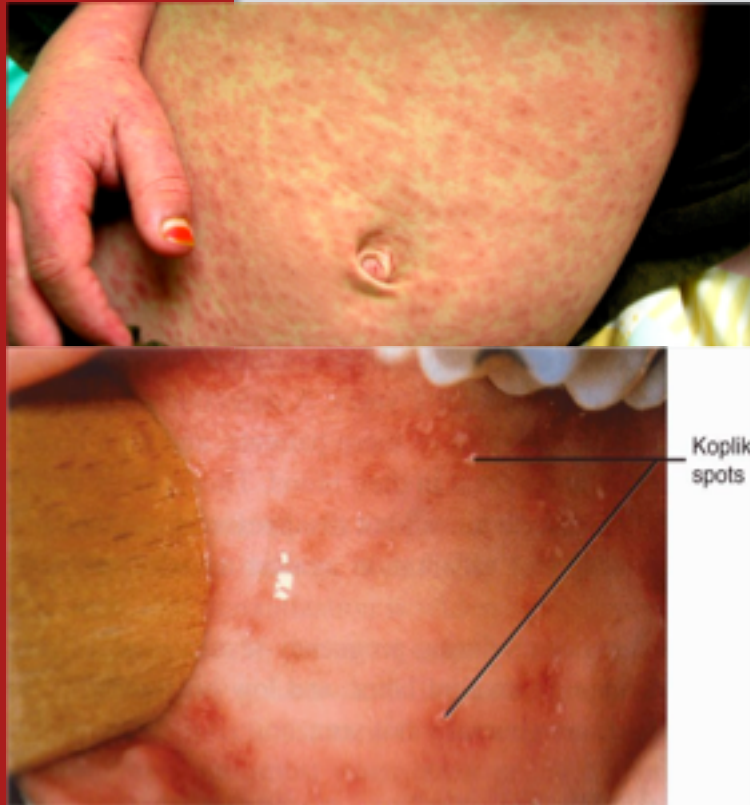
- caused by an RNA paramyxovirus
- the virus primarily infects the salivary glands, and hence its name—mumps—is derived from Latin, “to grimace.”
- Infection also may involve the gonads, meninges, pancreas, and other organs.
- It is transmitted by direct contact with respiratory secretions, saliva, or through fomites.
- Treatment is symptomatic
- first trimester infection: increased risk of spontaneous abortion.
- Infection in pregnancy is not associated with congenital malformations, and fetal infection is rare

Mumps



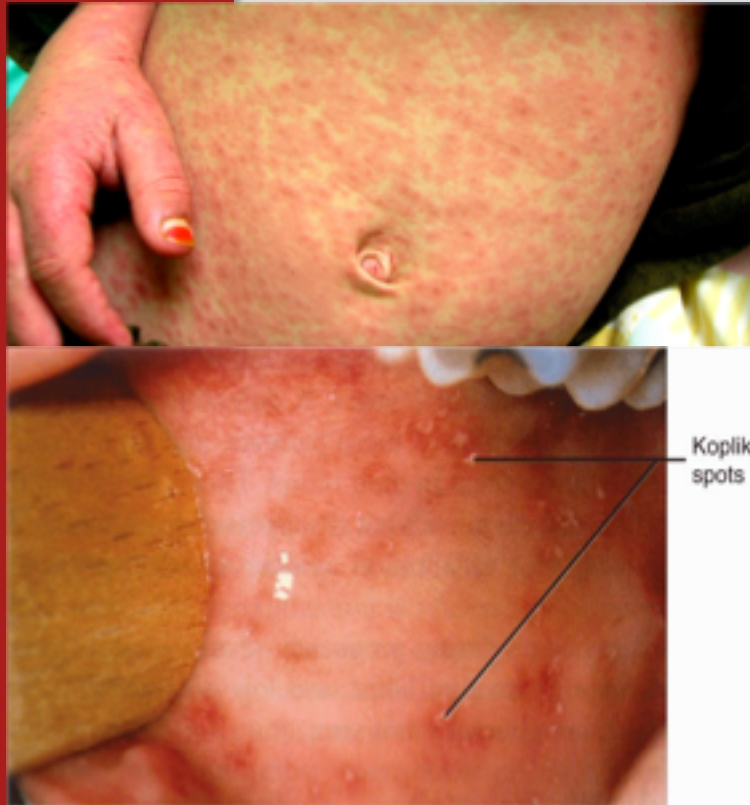
- the live attenuated MMR vaccine—measles, mumps, and rubella—is contraindicated in pregnancy
- pregnancy should be avoided for 30 days after MMR vaccination.
- the vaccine may be given to susceptible women postpartum, and breast feeding is not a contraindication.

Rubeola (Measles)



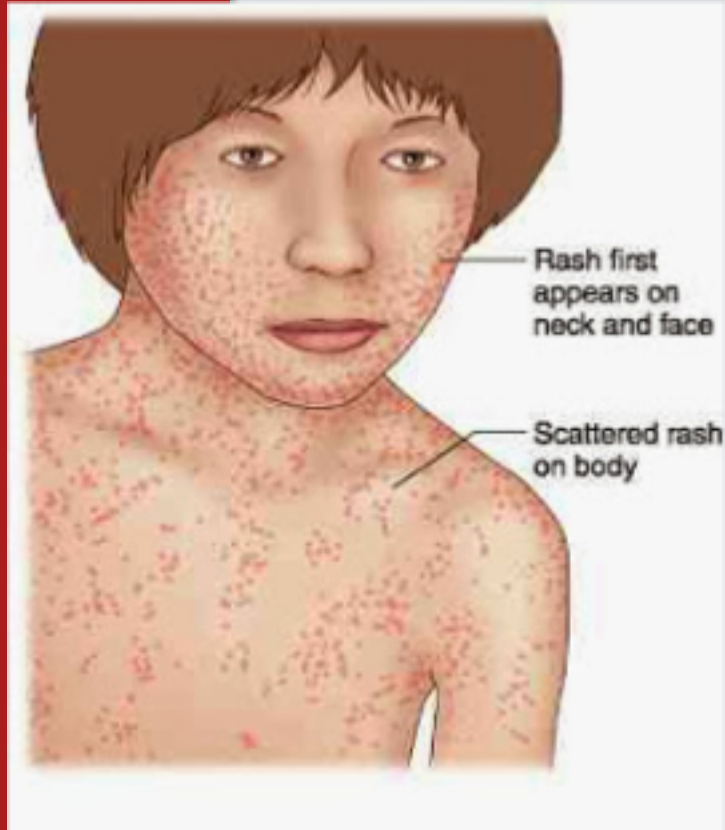
- caused by a highly contagious RNA virus of the family Paramyxoviridae that only infects humans.
- transmission is primarily by respiratory droplets
- characterized by fever, coryza, conjunctivitis, and cough.
- characteristic erythematous maculopapular rash develops on the face and neck and then spreads to the back, trunk, and extremities.
- Koplik spots are small white lesions with surrounding erythema found within the oral cavity.

Rubeola (Measles)



- Diagnosis is most commonly performed by serology, although RT-PCR tests are available.
- Treatment is supportive.
- Pregnant women without evidence of measles immunity should be administered intravenous immune globulin (IVIG), 400 mg/kg within 6 days of a measles exposure (McLean, 2013).
- Active vaccination is not performed during pregnancy. However, susceptible women can be vaccinated routinely post-partum, and breast feeding is not contraindicated
- virus does not appear to be teratogenic

Rubella (German Measles)



- RNA togavirus
- Rubella infection in the first trimester poses significant risk for abortion and severe congenital malformations.
- Transmission occurs via naso- pharyngeal secretions
- mild, febrile illness with a generalized maculopapular rash beginning on the face and spreading to the trunk and extremities.
- Other symptoms may include arthralgias or arthritis, head and neck lymphadenopathy, and conjunctivitis.
- incubation period is 12 to 23 days.
- Viremia usually precedes clinical signs by about a week, and adults are infectious during viremia and through 5 to 7 days of the rash.

Rubella (German Measles):Fetal effects

- Rubella is one of the most complete teratogens, and sequelae of fetal infection are worst during organogenesis → *congenital rubella syndrome*
- Pregnant women infection rates:
 - ≤ 12 weeks of gestation: 90% chance of fetal congenital infection
 - At 13 to 14 weeks' gestation: 54 %
 - end of the second trimester: 25 %

Rubella (German Measles): CONGENITAL RUBELLA SYNDROME

1. Eye defects—cataracts and congenital glaucoma
 2. Congenital heart defects—patent ductus arteriosus and
 3. pulmonary artery stenosis
 4. Sensorineural deafness—the most common single defect
 5. Central nervous system defects—microcephaly, developmental delay, mental retardation, and meningoencephalitis
 6. Pigmentary retinopathy
 7. Neonatal purpura
 8. Hepatosplenomegaly and jaundice
 9. Radiolucent bone disease
- **“extended rubella syndrome”** → panencephalitis and type 1 diabetes may develop clinically until the second or third decade of life.

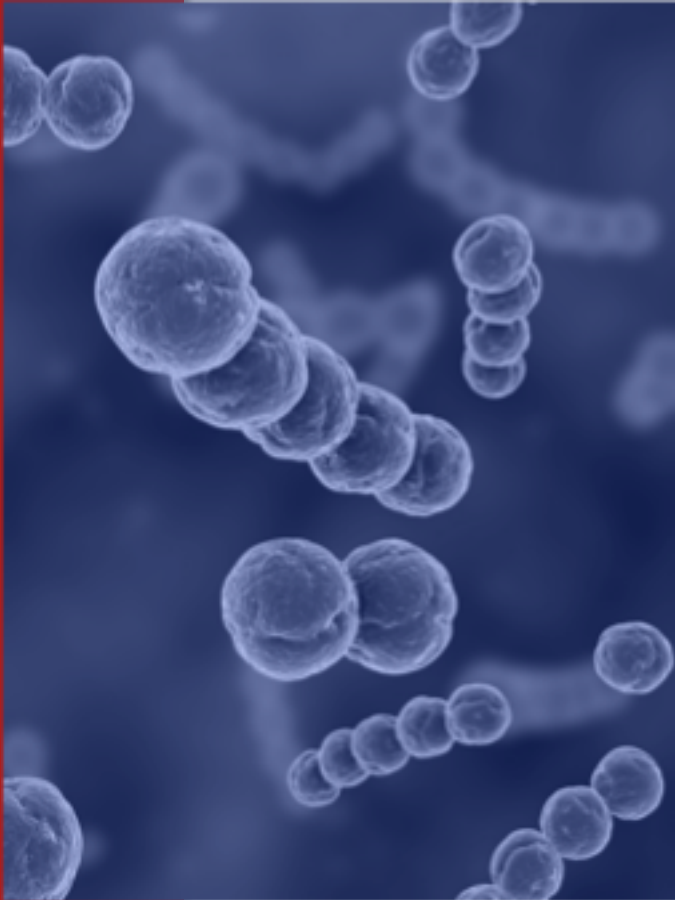
Rubella (German Measles): Management and Prevention

- no specific treatment for rubella.
- Droplet precautions for 7 days after the onset of the rash are recommended.
- Primary prevention relies on comprehensive vaccination programs
- To eradicate rubella and prevent congenital rubella syndrome completely, a comprehensive approach is recommended for immunizing the adult population
- MMR vaccine should be offered to nonpregnant women of childbearing age who do not have evidence of immunity whenever they make contact with the health-care system.
- Vaccination of all susceptible hospital personnel who might be exposed to patients with rubella or who might have contact with pregnant women is important.
- Rubella vaccination should be avoided 1 month before or during pregnancy because the vaccine contains attenuated live virus.
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Bacterial infections



Group A Streptococcus



- *Streptococcus pyogenes*: most frequent bacterial cause of acute pharyngitis and is associated with several systemic and cutaneous infections.
- Treatment, usually with penicillin, is similar in pregnant and nonpregnant women
- May cause puerperal infection. → remains the most common cause of severe maternal postpartum infection and death worldwide
- “streptococcal toxic shock syndrome” → hypotension, fever, and multiorgan failure with associated bacteremia.
- No vaccine for group A streptococcus is commercially available.

Group B Streptococcus (GBS)



- *Streptococcus agalactiae* is a group B organism that can be found to colonize the gastrointestinal and genitourinary tract in 20 to 30 % of pregnant women.
- implicated in preterm labor, premature ruptured membranes, clinical and subclinical chorioamnionitis, and fetal infections.
- can also cause maternal bacteriuria, pyelonephritis, osteomyelitis, postpartum mastitis, and puerperal infections.

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Group B Streptococcus (GBS)



- Neonatal sepsis has received the most attention due to its devastating consequences.
- **“Early-onset disease”**: infection < 7 days after birth ;
 - septicemia involves signs of serious illness that usually develop within 6 to 12 hours of birth that include respiratory distress, apnea, and hypotension.
- **“Late-onset disease”** manifests as meningitis 1 week to 3 months after birth

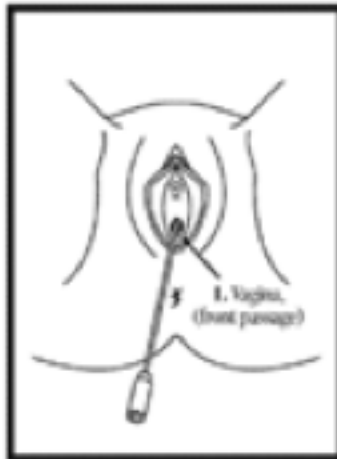
Group B Streptococcus (GBS): Prophylaxis for perinatal infections



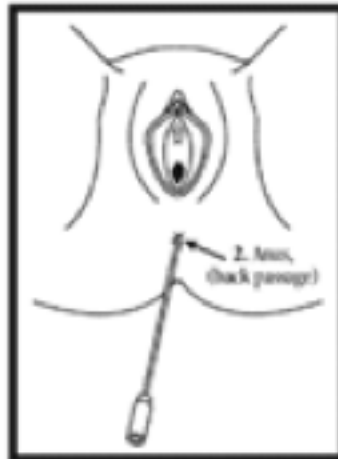
- Guidelines for perinatal prevention of GBS disease include doing rectovaginal culture screening for GBS at 35 to 37 weeks' gestation followed by intrapartum antibiotic prophylaxis for women identified to be carriers.
- screening and intrapartum chemoprophylaxis for women with preterm prematurely ruptured membranes or preterm labor

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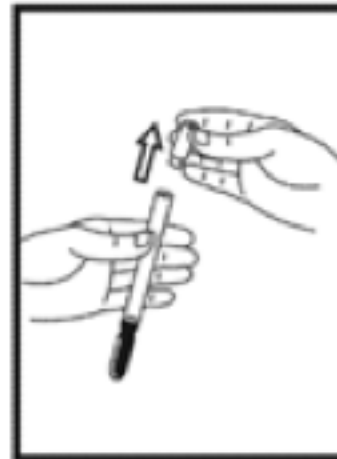
Instructions for the collection of a genital swab for the detection of a group B streptococcus (GBS)



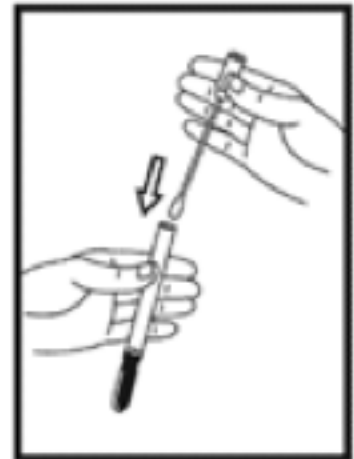
- 1.** Remove swab from packaging. Insert swab 2cm into vagina, (front passage). Do not touch cotton end with fingers.



- 2.** Insert the same swab 1cm into anus, (back passage).



- 3.** Remove cap from sterile tube.



- 4.** Place swab into tube. Ensure cap fits firmly.

- 5.** Make sure swab container is fully labelled with name, u.r. number, date and time of collection. Place swab container into transport bag and hand it to a staff member.

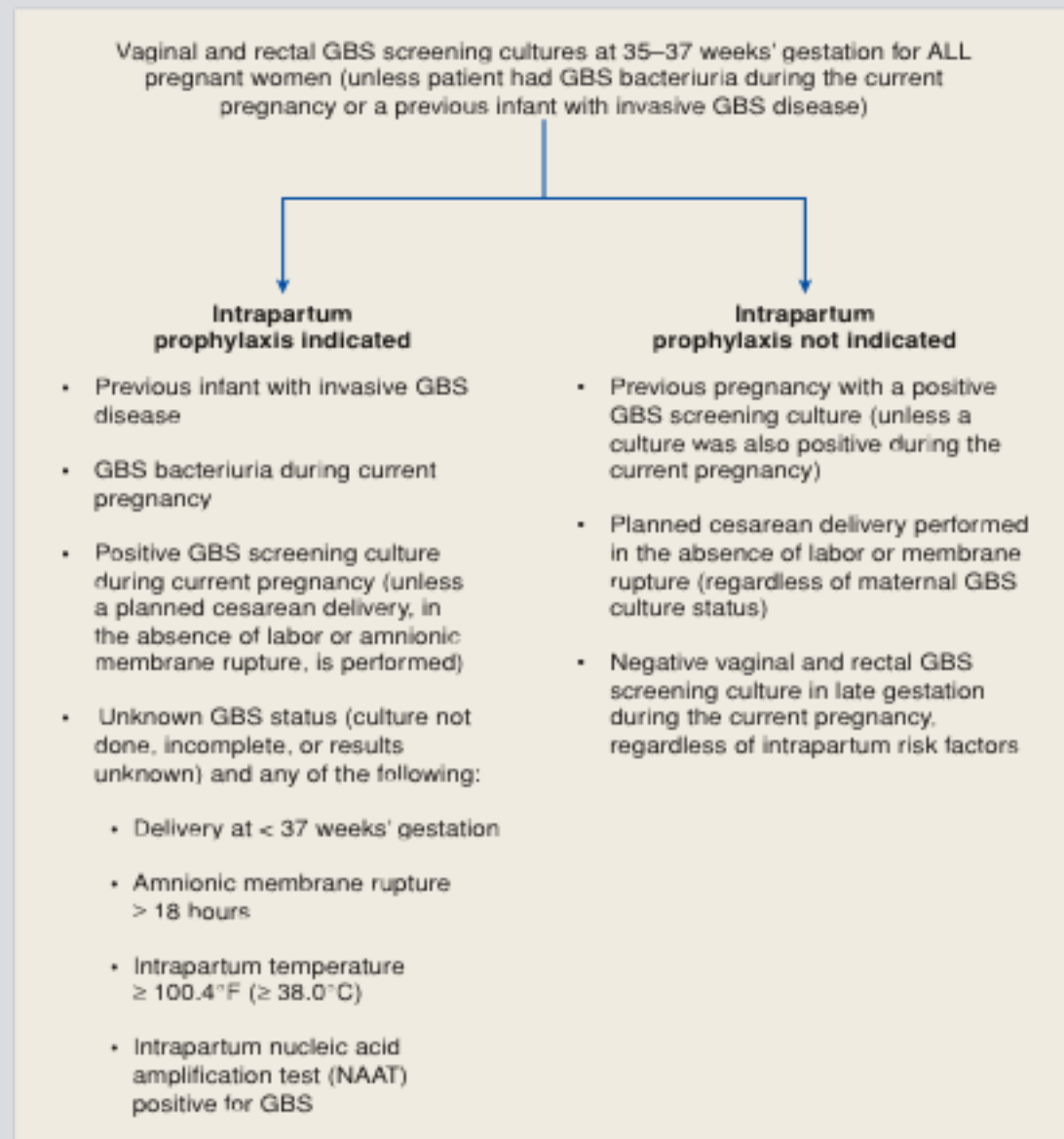


FIGURE 64-5 Indications for intrapartum prophylaxis to prevent perinatal group B streptococcal (GBS) disease under a universal prenatal screening strategy based on combined vaginal and rectal cultures obtained at 35 to 37 weeks' gestation. (From Centers for Disease Control and Prevention, 2010.)

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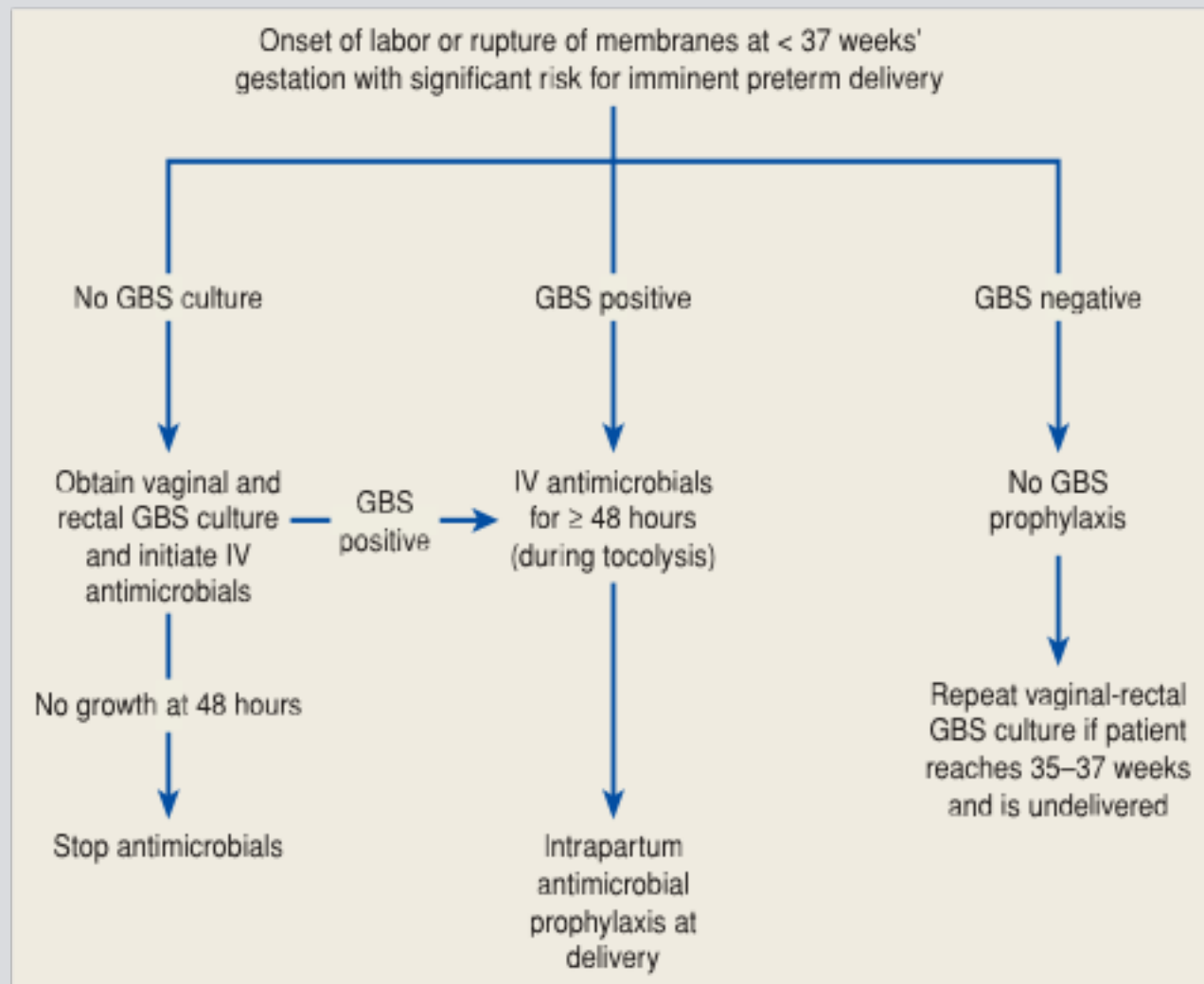


FIGURE 64-6 Sample algorithm for prophylaxis for women with group B streptococcal (GBS) disease and threatened preterm delivery. This algorithm is not an exclusive course of management, and variations that incorporate individual circumstances or institutional preferences may be appropriate. IV = intravenous. (Adapted from Centers for Disease Control and Prevention, 2010.)

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TABLE 64-3. Regimens for Intrapartum Antimicrobial Prophylaxis for Perinatal GBS Disease

Regimen	Treatment
Recommended	Penicillin G, 5 million units IV initial dose, then 2.5 to 3.0 million units IV every 4 hours until delivery
Alternative	Ampicillin, 2 g IV initial dose, then 1 g IV every 4 hours or 2 g every 6 hours until delivery
Penicillin allergic	
Patients not at high risk for anaphylaxis	Cefazolin, 2 g IV initial dose, then 1 g IV every 8 hours until delivery
Patients at high risk for anaphylaxis and with GBS susceptible to clindamycin	Clindamycin, 900 mg IV every 8 hours until delivery
Patients at high risk for anaphylaxis and with GBS resistant to clindamycin or susceptibility unknown	Vancomycin, 1 g IV every 12 hours until delivery

GBS = group B *Streptococcus*; IV = intravenous.

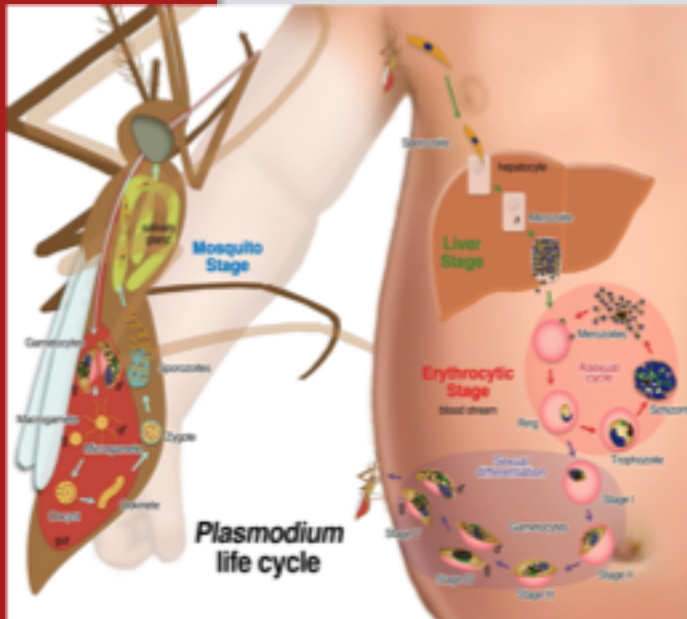
Adapted from the Centers for Disease Control and Prevention, 2010.

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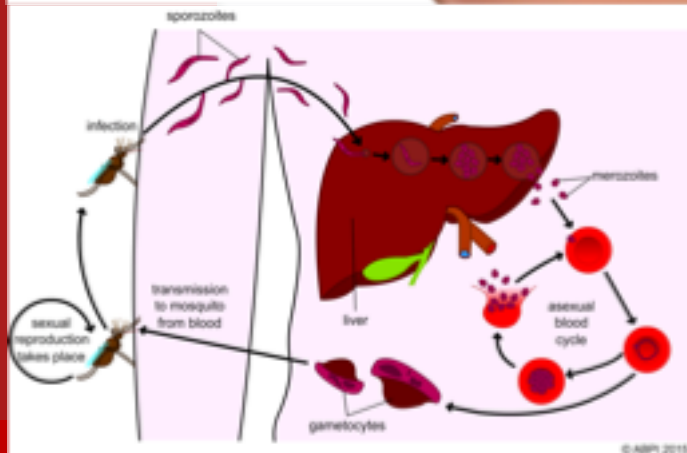
Protozoal infections



Malaria

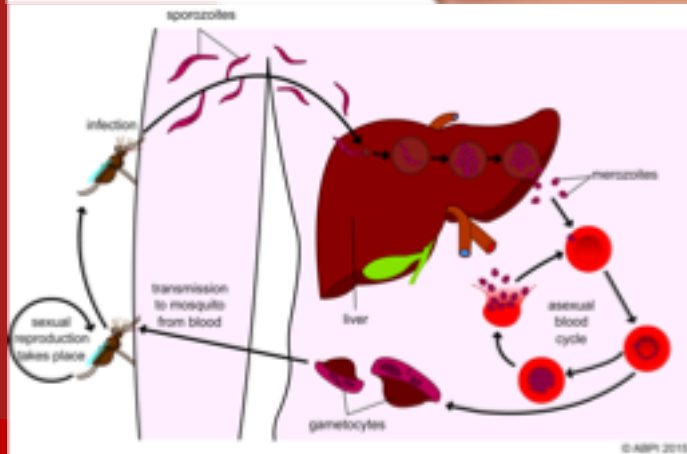
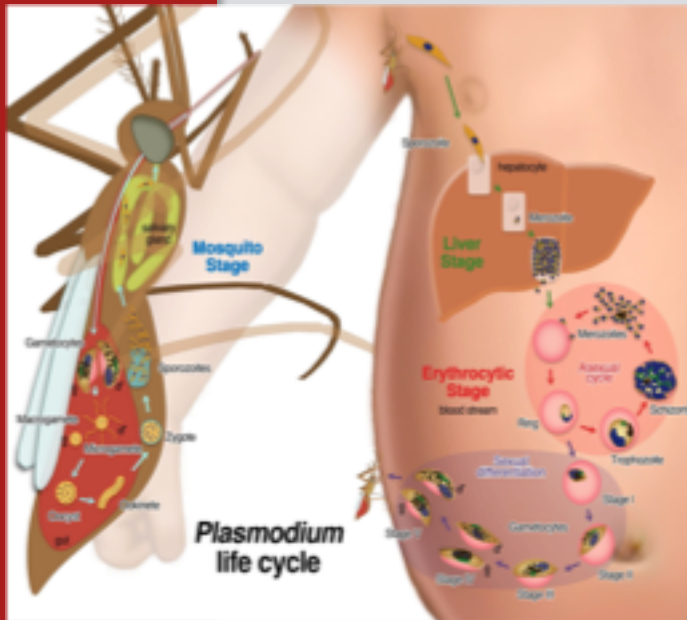


- Transmitted by infected Anopheles mosquitoes, five species of Plasmodium cause human disease—falciparum, vivax, ovale, malariae, and knowlesi
- clinical findings are fever, chills, and flu-like symptoms including headaches, myalgia, and malaise
- Malaria may be associated with anemia and jaundice, and falciparum infections may cause kidney failure, coma, and death.



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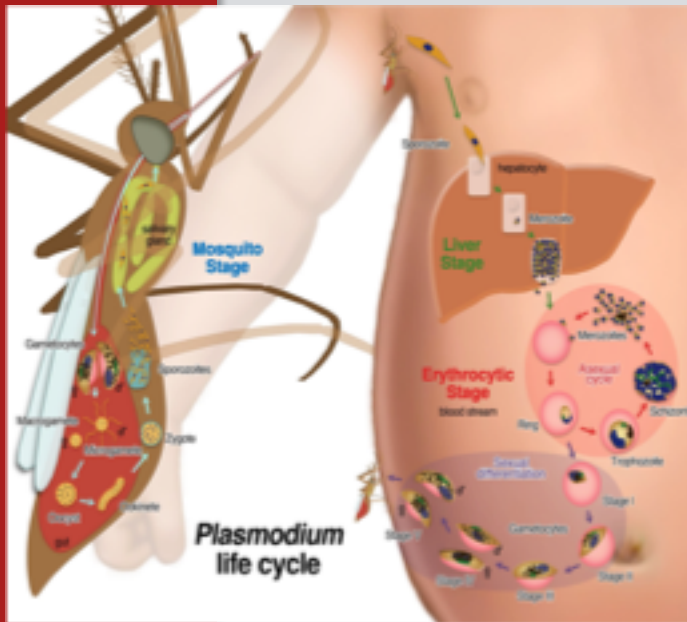
Malaria



- Malarial infections during pregnancy are associated with increased rates of perinatal morbidity and mortality:
 - stillbirth, preterm birth, low birthweight, and maternal anemia.
 - adverse perinatal outcomes correlate with high levels of placental parasitemia
 - Infections with *P. falciparum* are the worst, and early infection increases the risk for abortion
 - incidence of malaria increases significantly in the latter two trimesters and postpartum
 - congenital malaria occurs in < 5 percent of neonates born to infected mothers.

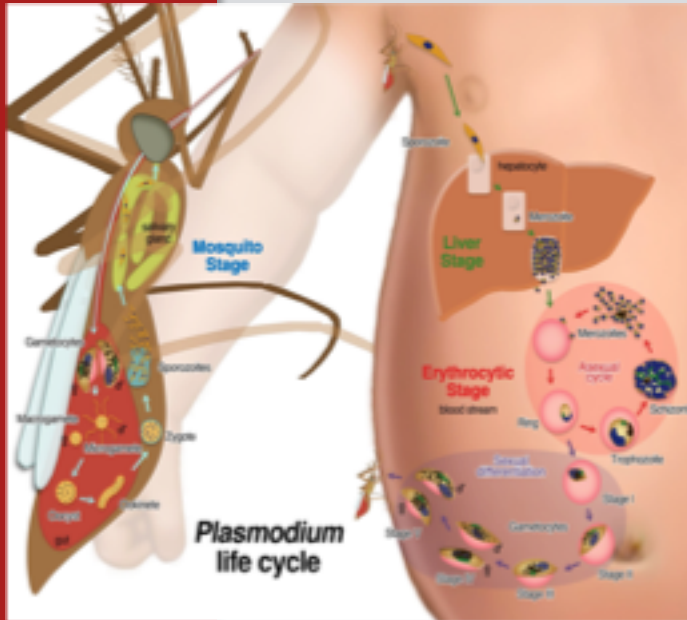
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Malaria: Diagnosis



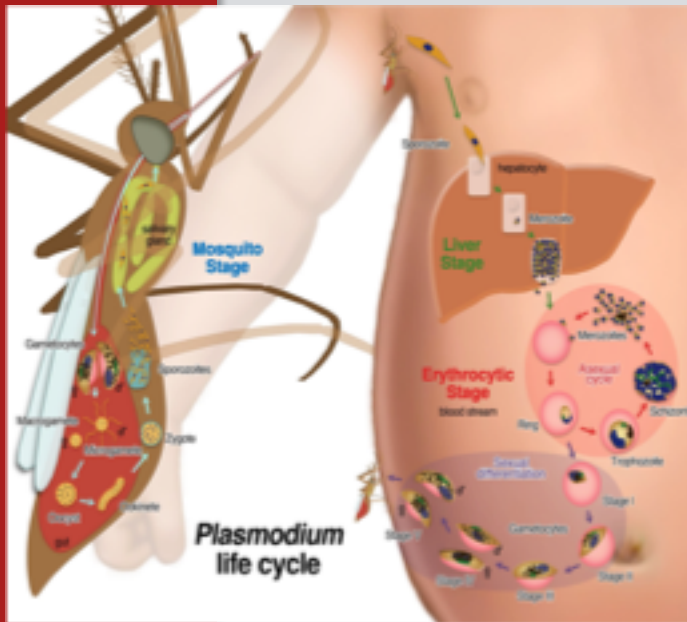
- Identification of parasites by microscopical evaluation of a thick and thin blood smear remains the gold standard for diagnosis.
- Malaria-specific antigens are now being used for rapid diagnostic testing.

Malaria: Management



- pregnant women diagnosed with uncomplicated malaria caused by *P vivax*, *P malariae*, *P ovale*, and chloroquine-sensitive *P falciparum* should be treated with **chloroquine or hydroxychloroquine**.
- For women infected with chloroquine-resistant *P falciparum*, **mefloquine or quinine sulfate with clindamycin** should be used.
- Chloroquine-resistant *P vivax* should be treated with **mefloquine**.
- Chloroquine-sensitive *P vivax* or *P ovale* should be treated with **chloroquine** throughout pregnancy and then **primaquine** postpartum.

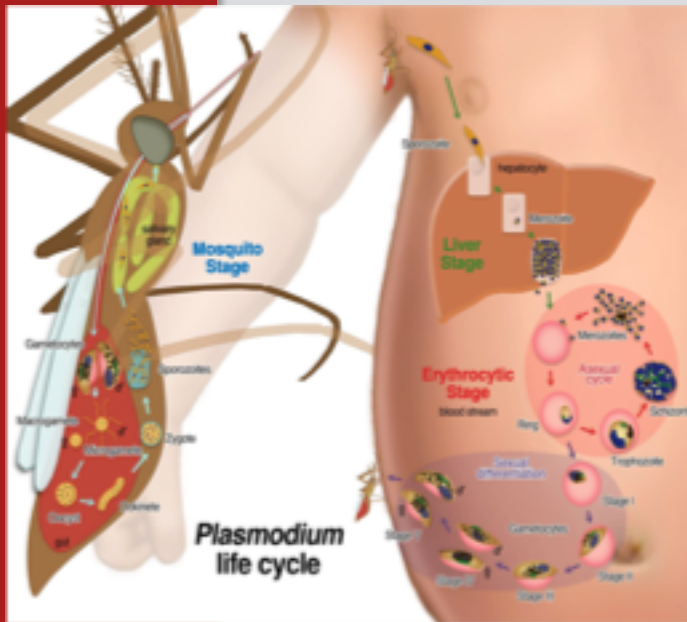
Malaria: Management



- World Health Organization (2011) allows for the use of intermittent preventative therapy during pregnancy → at least two treatment doses of sulfadoxine-pyrimethamine in the second and third trimesters.
- the rationale is that each dose will clear placental asymptomatic infections and provide up to 6 weeks of posttreatment prophylaxis.
- this ideally will decrease the rate of low-birthweight newborns in endemic areas

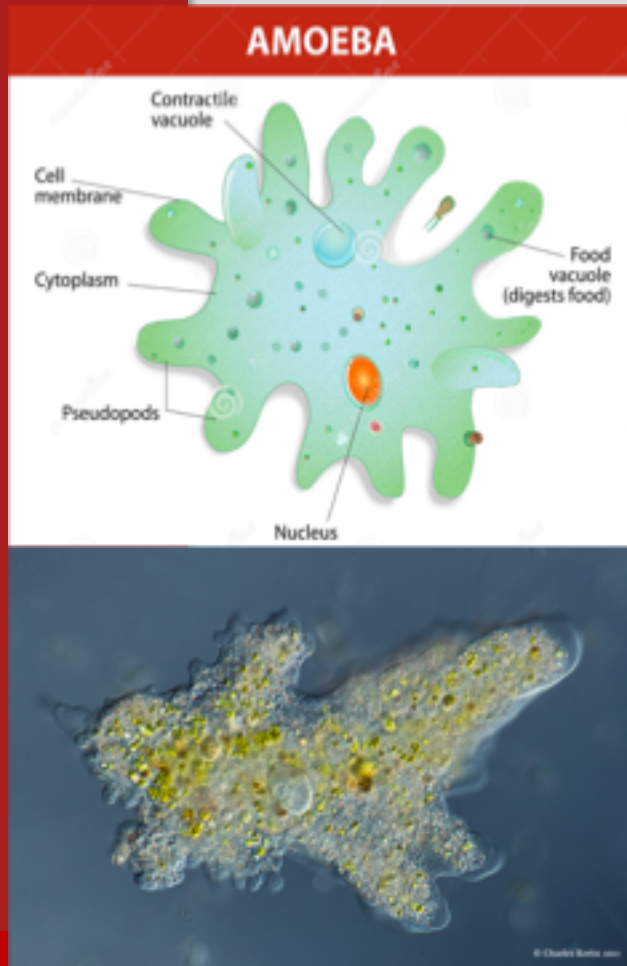
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Malaria: Prevention and chemoprophylaxis



- Insecticide-treated netting, pyrethroid insecticides, and N,N-diethyl-m-toluamide (DEET)-based insect repellent decrease malarial rates in endemic areas → well tolerated in pregnancy
- If travel is necessary, chemoprophylaxis is recommended.
 - **Chloroquine and hydroxychloroquine** prophylaxis is safe and well tolerated in pregnancy.
 - For travelers to areas with chloroquine-resistant *P. falciparum*, **mefloquine** remains the only chemoprophylaxis recommended.

Amoebiasis



- Most persons infected with *Entamoeba histolytica* are asymptomatic.
- Amoebic dysentery, however, may take a fulminant course during pregnancy, with fever, abdominal pain, and bloody stools.
- Prognosis is worse if complicated by a hepatic abscess.
- Diagnosis is made by identifying *E. histolytica* cysts or trophozoites within a stool sample.
- Therapy is similar to that for the nonpregnant woman, and metronidazole or tinidazole is the preferred drug for amoebic colitis and invasive disease.
- Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, Casey BM, Sheffield JS (eds). William's Obstetrics 24th edition; 2014; chapter 64 INFECTIOUS DISEASES

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