

Unit 11 (Part 2)

SUBKINGDOM PROTOZOA

PH. APICOMPLEXA

CLASS SPOROZOA

Genus Plasmodium.

Plasmodium vivax

Plasmodium ovale

Plasmodium falciparum (the most pathogenic, causative agent of tropical malaria disease)

Plasmodium malaria

Disease: Malaria disease

Geographic distribution: mainly in countries with subtropical and tropical climate.

Morphology: sporozoit, schizont, merozoit, gametocyte.

Mode of transmission: by means biting female mosquito of Genus Anopheles.

Life cycle:

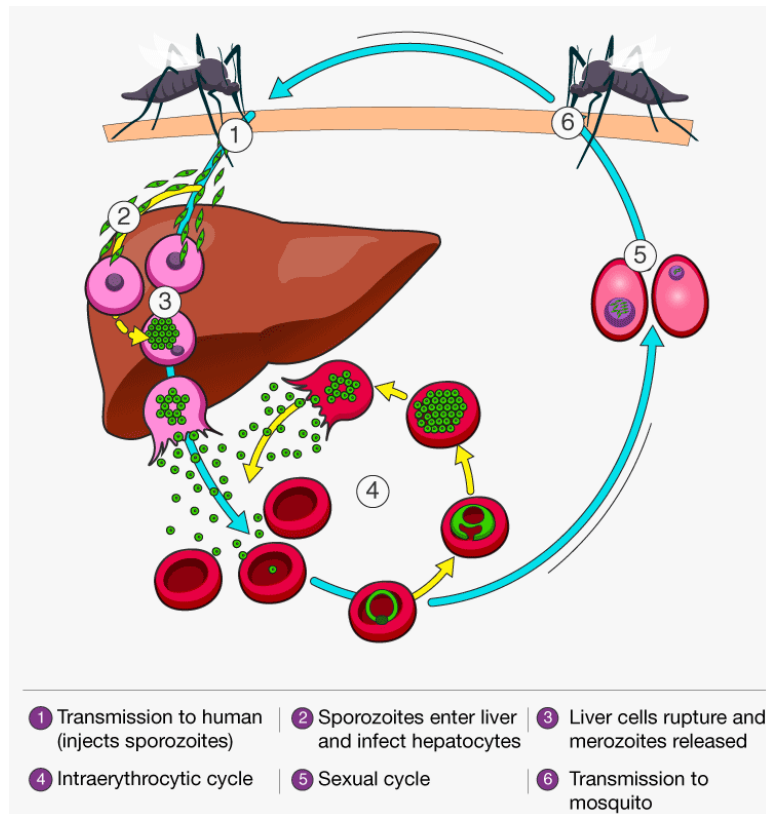
A definitive host is female mosquito of Genus Anopheles

An intermediate host is human.

Pathogenic form for human is sporozoit, pathogenic form for mosquito is gametocyte.

By means biting the parasite enters the human bloodstream in the form of a *sporozoite*. After about an 1 hour, the parasite reaches the liver cells, where it turns into the *schizont* stage and multiplies by multiple fission - *schizogony* (pre-erythrocyte stage). As a result of fission, *merozoites* are formed in large quantities. The liver cell is destroyed and the parasite enters the bloodstream. The parasite is introduced into the red blood cell. Some merozoites turn into *immature gametocytes*, and the other part again turns into *schizonts*. Inside the red blood cell, multiple fission occurs again (*erythrocyte stage of schizogonia*). As a result, the red blood cell is destroyed and parasite enters the blood serum. Together with the parasite, toxic products of its vital activity also come out. There is an attack of malaria (high fever, severe chills) happens. After the attack, the parasite invades other red blood cells and the cycle repeats. The interval between attacks is 48 or 72 hours, depending on the type of plasmodium. For further development, the parasite must enter the mosquito's body. With a bite, the parasite is found in the body of a mosquito. Further development occurs in the walls of the mosquito's gut. Only immature gametocytes develop. Immature gametocytes become mature as a result of the *gametogony process*. As a result, mature female and male gametocytes are formed, which merge and form a *zygote*. The zygote must enter the salivary glands, so it becomes mobile-*ookineta* and enters the salivary glands, where it turns into an *oocyst*. Inside of the oocyst the

sporogony process takes place. As a result, pathogenic cells for the next victim - *sporozoites* are formed.



Laboratory diagnostics: detection of parasites in the blood (thick drop, smear). It is recommended to take blood during the attack or immediately after it.

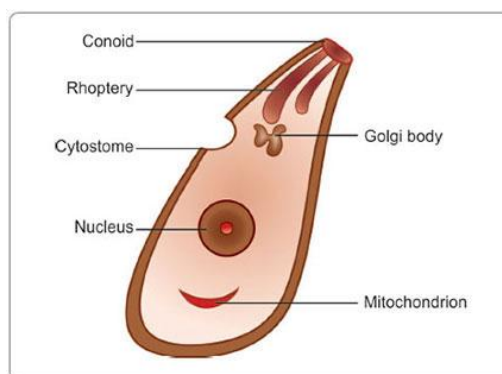
Prevention: personal – protection from mosquito bites (using repellents); public – identification and treatment of patients and parasite carriers, destruction of vectors-mosquitoes of the genus *Anopheles*, sanitary and educational work.

Toxoplasma gondii

Disease: Toxoplasmosis

Geographic distribution: worldwide

Morphology: trophozoite (vegetative stage) has a semilunar shape, one end is pointed, the other is rounded. At the pointed end of the toxoplasma, there is a conoid that serves to attach the parasite to the host cell.



Mode of transmission:

- through contaminated food of animal origin (meat, milk, eggs)
- in contact with cats (contamination of hands with oocysts)
- transplacental; the frequency of transmission of toxoplasmas to the fetus is about 27%; the frequency of congenital toxoplasmosis is 0.7-7.5 per 1000 newborns.
- blood transfusions and organ transplantation

Life cycle: the definitive host are representatives of the Feline family (domestic cat etc.)

An intermediate host are all mammals (including humans), birds and reptiles.

The main hosts are infected by eating affected mouse-like rodents. Trophozoites enter the epithelial cells of the digestive tract, where schizogony occurs with the formation of merozoites. some merozoites are converted into microgametes and macrogametes. As a result of gamete fusion (copulation), oocysts (true cysts) are formed. Oocysts are excreted with feces into the external environment, where, under favorable conditions, after 1-5 days, two sporocysts with four oocysts are formed in each oocyst the sporozoites (fig 1). They become invasive and can remain viable in the external environment for several years.

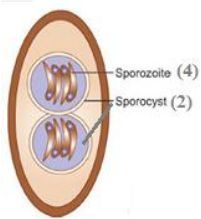
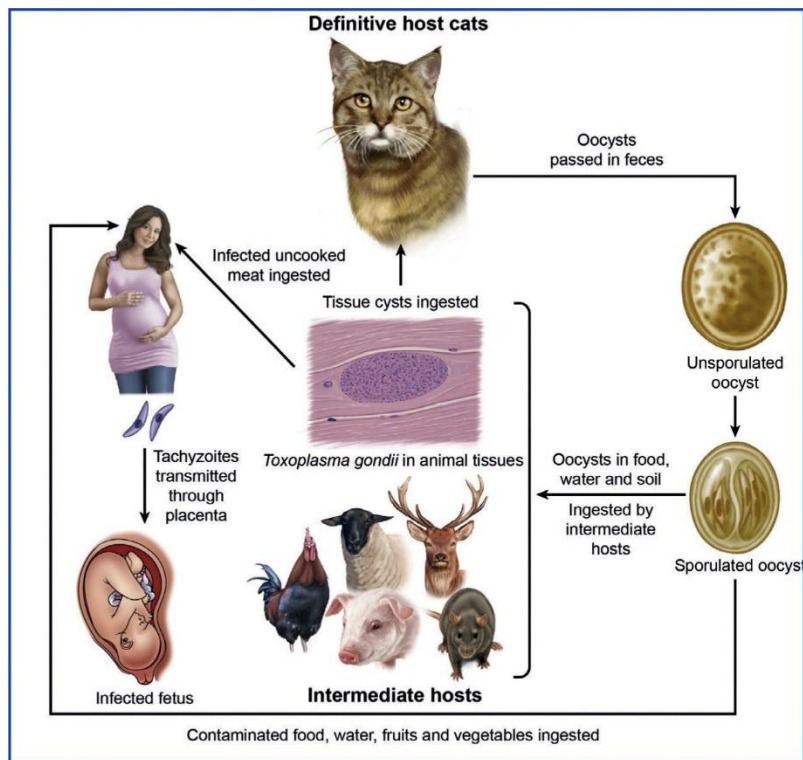


Fig. 1.

Oocysts with sporozoites enter the body of the intermediate host (human). In the small intestine, sporozoites are introduced into epithelial cells, where they turn into trophozoites and multiply by dividing in two. With the current of lymph, they enter the blood and penetrate into the cells of the liver, spleen, lymph nodes, nervous system, eyes, skeletal muscles, myocardium, etc. Here they multiply intensively, filling almost the entire cytoplasm of the cell. A cluster of trophozoites covered by the cell membrane forms a tissue cyst (pseudocyst). The external membrane of these cysts can break, and trophozoites, leaving them, are introduced into neighboring cells. In tissue cysts, trophozoites are viable for decades and in the chronic course of the disease, cysts can be covered with an additional connective tissue membrane.



Pathogenic effects:

Mechanical (damage to cells, hemorrhages in serous membranes, necrotic foci in the liver, spleen, brain).

Toxic-allergic (poisoning of the body with waste products).

Symptoms. Acquired toxoplasmosis is benign, often asymptomatic. The clinical manifestation occurs in people with weakened immunity. The disease occurs with symptoms of chronic intoxication

Laboratory diagnostics: immunological methods.

Prevention: personal hygiene after contact with cats, use only well-heat-treated meat and poultry, boiled milk, observance of rules of cutting and processing of animal carcasses. Public – protection of the environment and water sources from contamination by animal secretions, sanitary and educational work.