



Parasites Affecting The Reproductive System

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➤ Parasitic infections affecting The Reproductive System:

1. *Toxoplasma gondii*

2. *Trichomonas vaginalis*

3. *Schistosoma* spp.

4. *Wuchereria bancrofti*



2) *Toxoplasma gondii*



Case Scenario

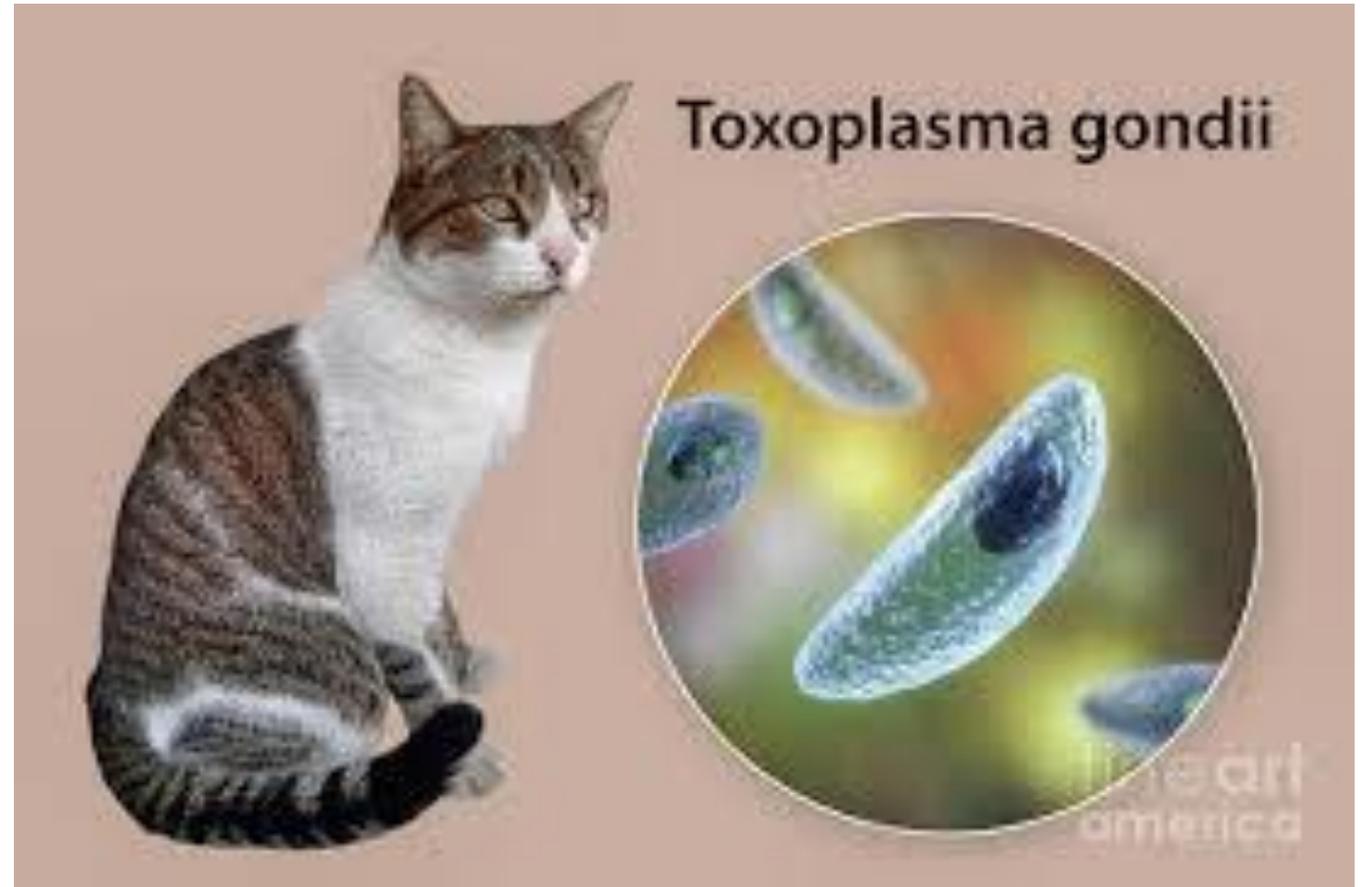


A young lady works in medical laboratory. She had been married 3 years ago, and she got pregnant and aborted twice. The physician asked her to do laboratory tests of repeated abortion and he found that *Toxoplasma gondii* IgM titre was positive, and *Toxoplasma gondii* IgG titre was positive.

What is the most likely parasitic diagnosis?

Geographical distribution:

Worldwide distribution





➤ *Toxoplasma gondii* morphological stages:

Toxoplasma gondii occurs in 4 forms:

- 1) Trophozoite (Tachyzoite).
- 2) Pseudocyst.
- 3) True tissue cyst.
- 4) Oocyst.



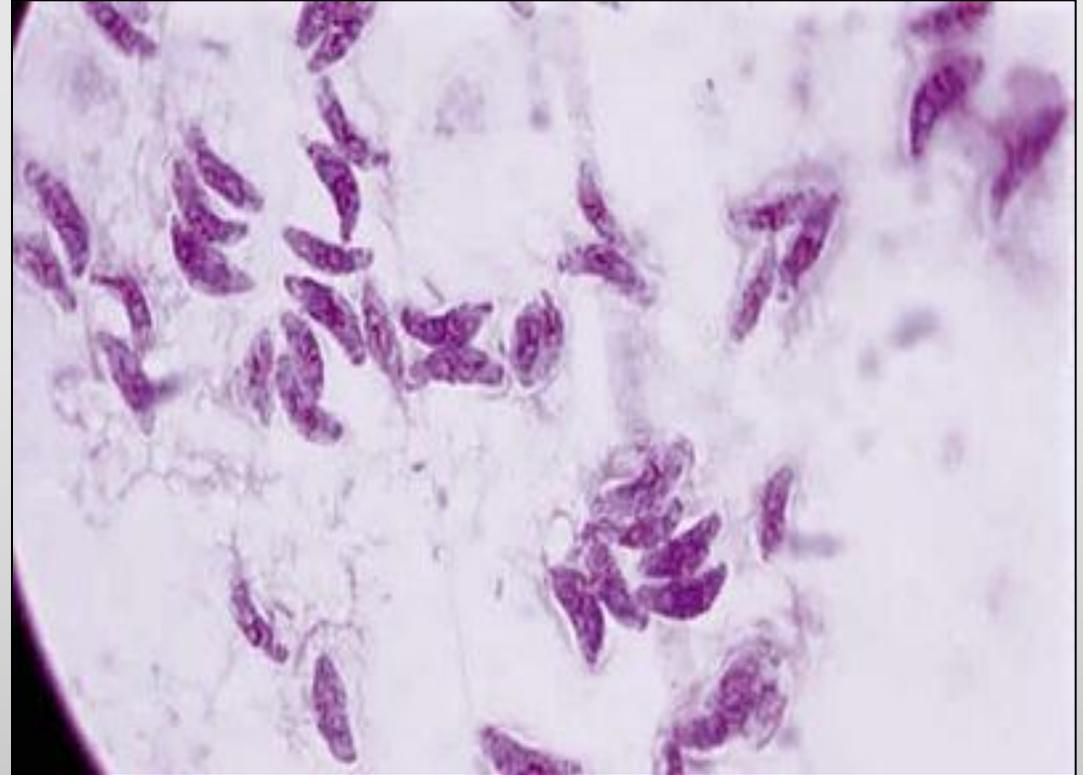
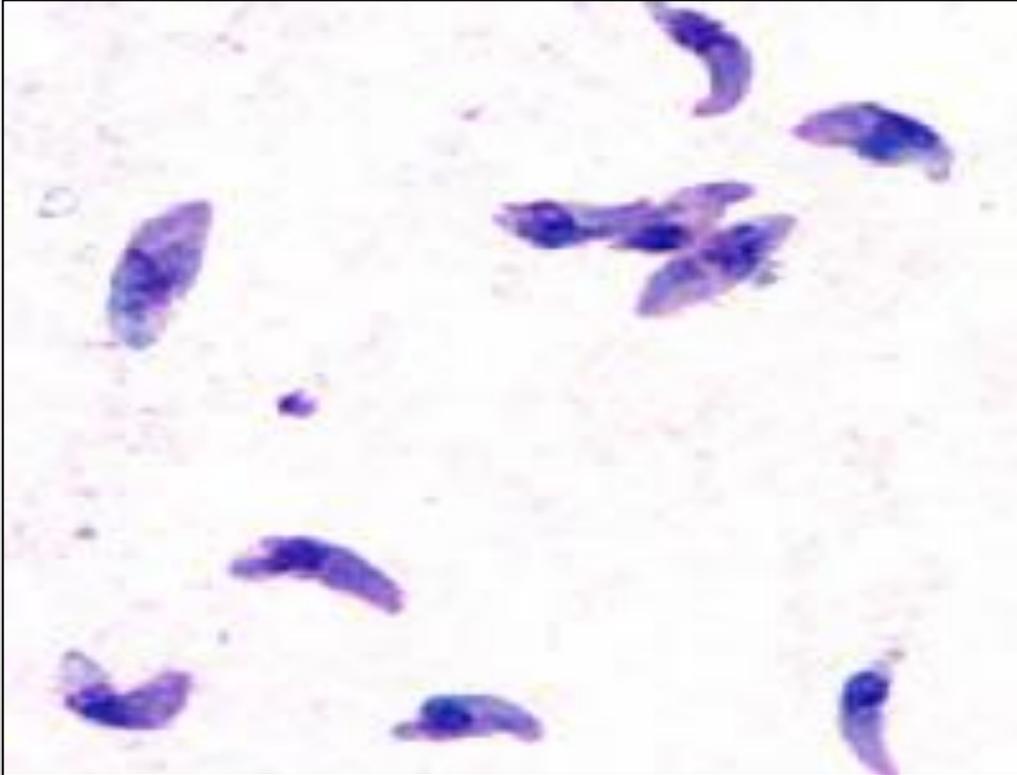


1) Trophozoite (Tachyzoite):

- It is the **active multiplying** stage, found in the **acute stage** of infection.
- *Shape*: crescent, with pointed anterior end and rounded posterior end.
- *Size*: 3x6 μ
- *Content*: has an ovoid posterior nucleus and anterior paranuclear granules.
- *Site*: seen intracellular in various tissues, multiplies within cytoplasmic vacuoles of any **nucleated cell**.



Toxoplasma tachyzoites



2) Pseudocyst:

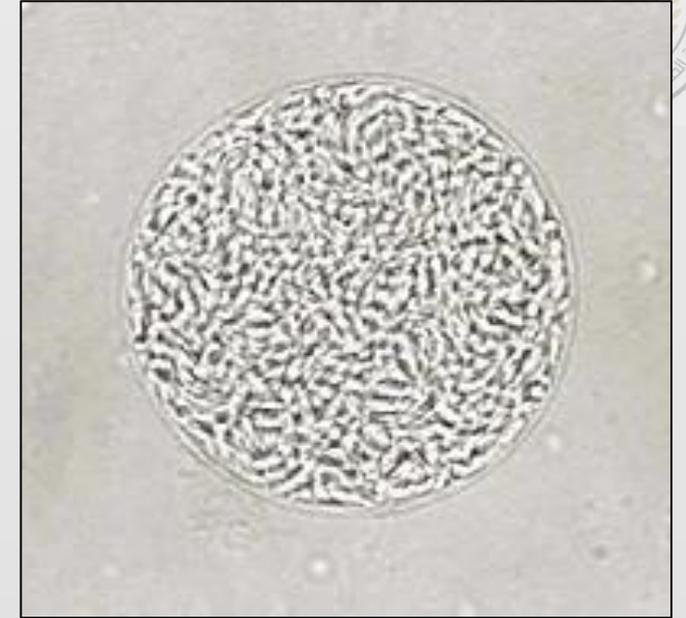
- It is found in the **acute stage** of infection.
- It is full of rapidly multiplying tachyzoites.
- It has **no** cyst wall.
- *Site:* It is localized inside the RECs.



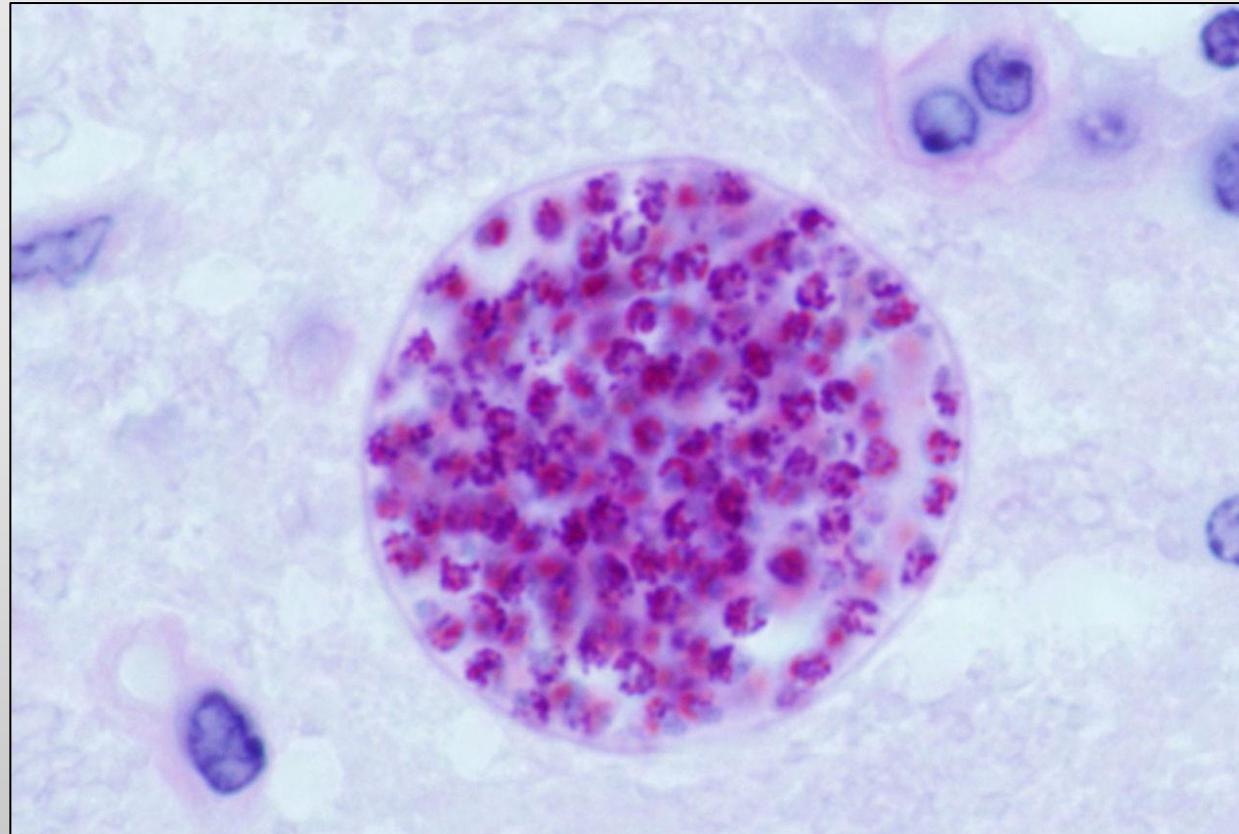
Toxoplasma pseudocyst

3) True tissue cyst:

- It is found in the **chronic stage** of infection.
- *Shape:* The cyst is round or oval
- *Size:* 5-50 μ
- *Content:* contains slowly multiplying bradyzoites.
- It has **cyst wall**.
- *Site:* found in the brain (**most common site**), skeletal and cardiac muscles and various organs.
- It remains viable for years, and immunosuppression causes reactivation of cysts.



Toxoplasma true tissue cyst



3) Oocyst: This stage is only present in **cats** and other felines.

- **Shape:** It is oval, surrounded by a thick resistant wall.
- **Size:** 10x12 μ
- Non-infectious when excreted in unsporulated or immature stage in cat feces.
- It sporulates, by sporogony, within 1-5 days and becomes infectious.
- The **mature** or sporulated oocyst contains 2 sporocysts, each containing 4 sporozoites (**disporocystic tetrazoic oocyst**).
- It may remain viable in moist shaded soil for a year or more.

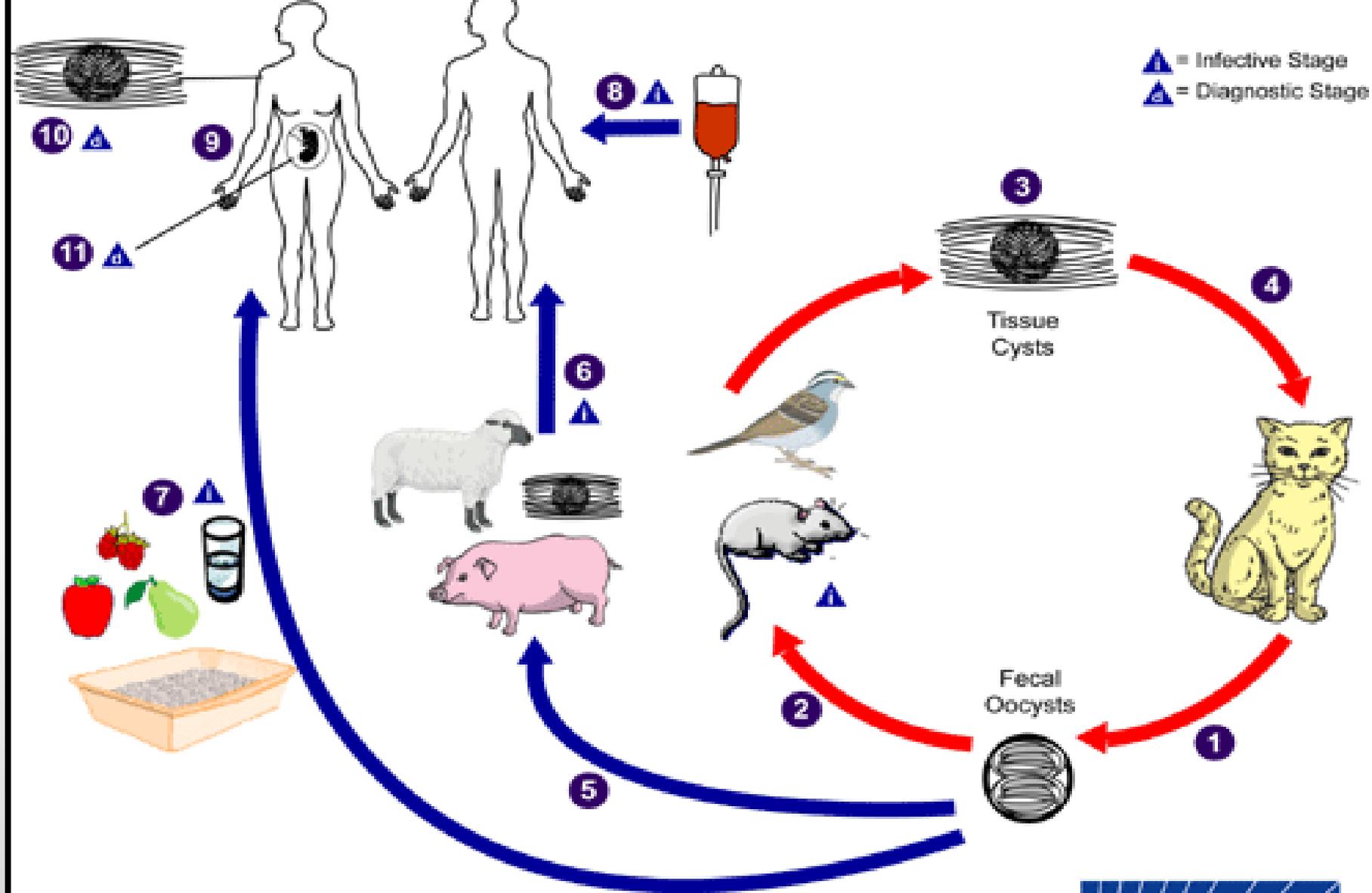




Toxoplasma gondii Life cycle:

- The life cycle of *T. gondii* is **heteroxenous** (alternation of generations between two hosts), where an **asexual cycle** occurs in the intermediate host, and **sexual cycle** occurs in the definitive host.

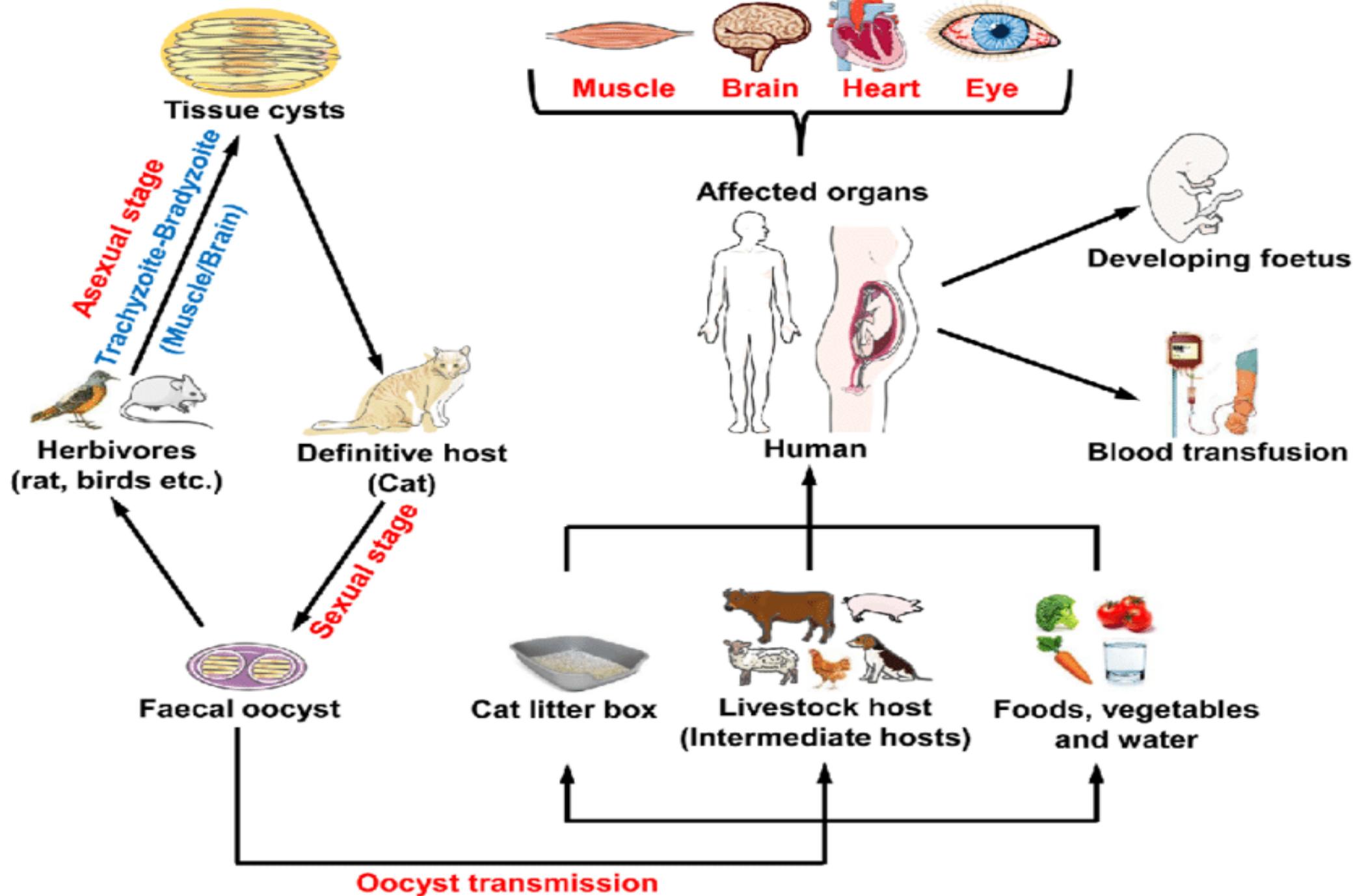
Toxoplasma gondii Life cycle





Toxoplasma gondii Life cycle:

- **Habitat:**
- *T. gondii* is an obligate intracellular parasite, which is found inside the **RECs**, brain, skeletal and cardiac muscles, and any other **nucleated** cells.
- **Definitive host:** **Cats** and other felines
- **Intermediate host:** **Man** and other mammals (mice, rabbits, goat, sheep, cattle, and pigs), reptiles and birds.
- **Infective stage:** **All stages** are infectious to humans; tachyzoites, pseudocysts, true tissue cysts and sporulated oocysts.





• Mode of infection:

1. Oral route via ingestion of:

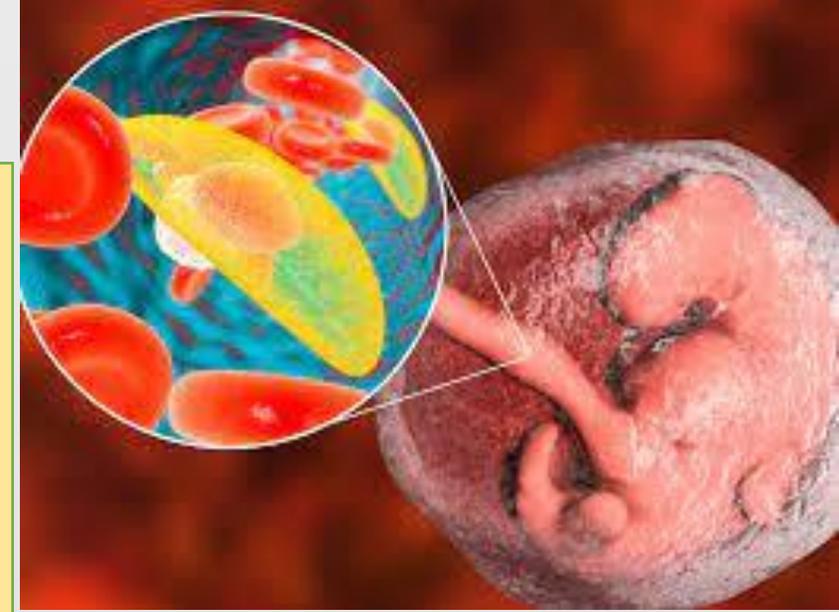
- Mature oocysts in food and drinks contaminated with cat feces.
- Pseudocysts or true cysts in raw or undercooked contaminated meat.
- Tachyzoites in unpasteurized goat's and cow's milk.

2. Inhalation of mature oocysts.
3. Blood transfusion.
4. Organ transplantation.

- **Mode of infection:**

5. Contamination of mucous membrane, skin abrasions by:

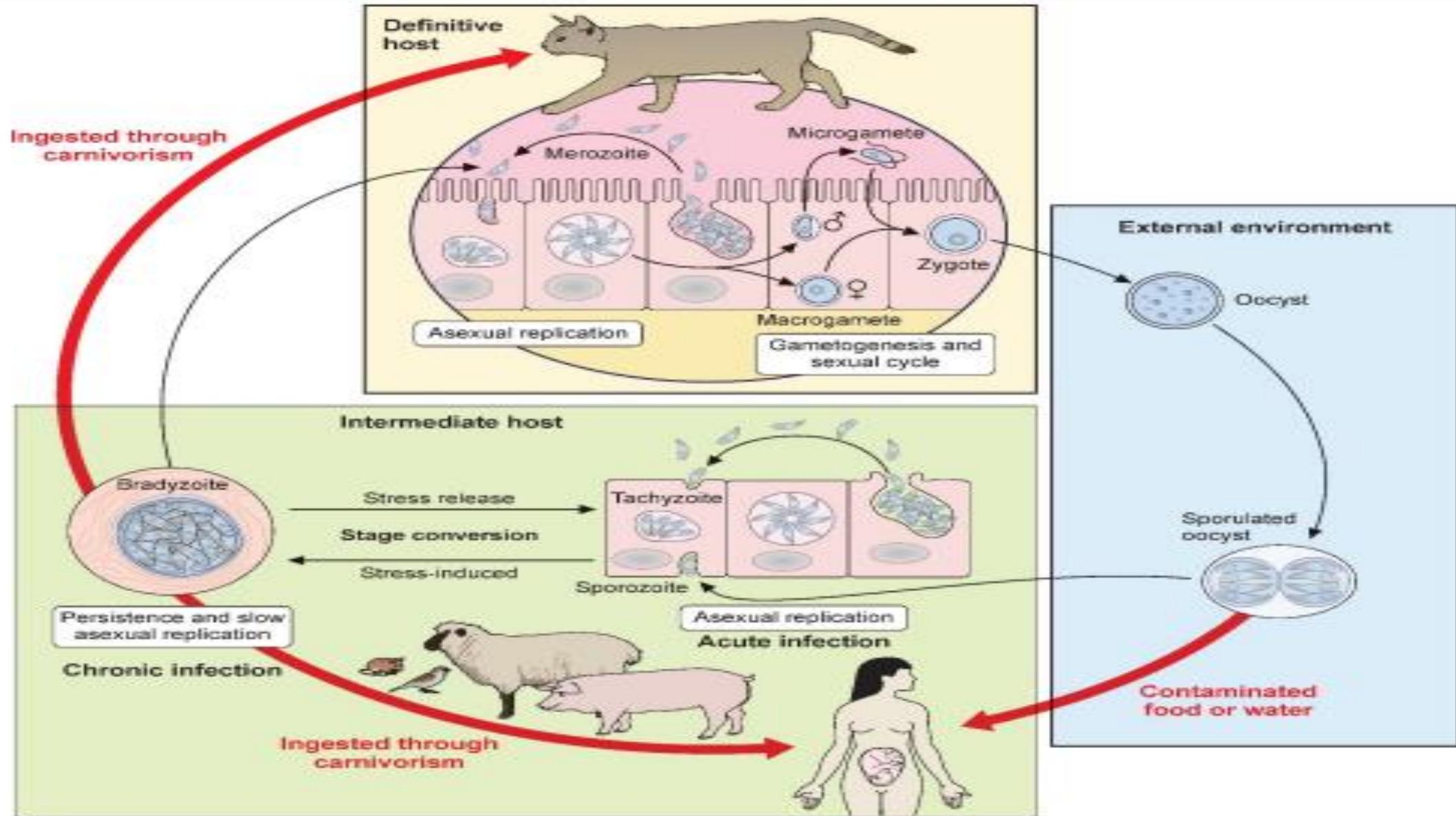
- Handling and preparation of fresh infected meat.
- Handling of infected blood by laboratory workers.

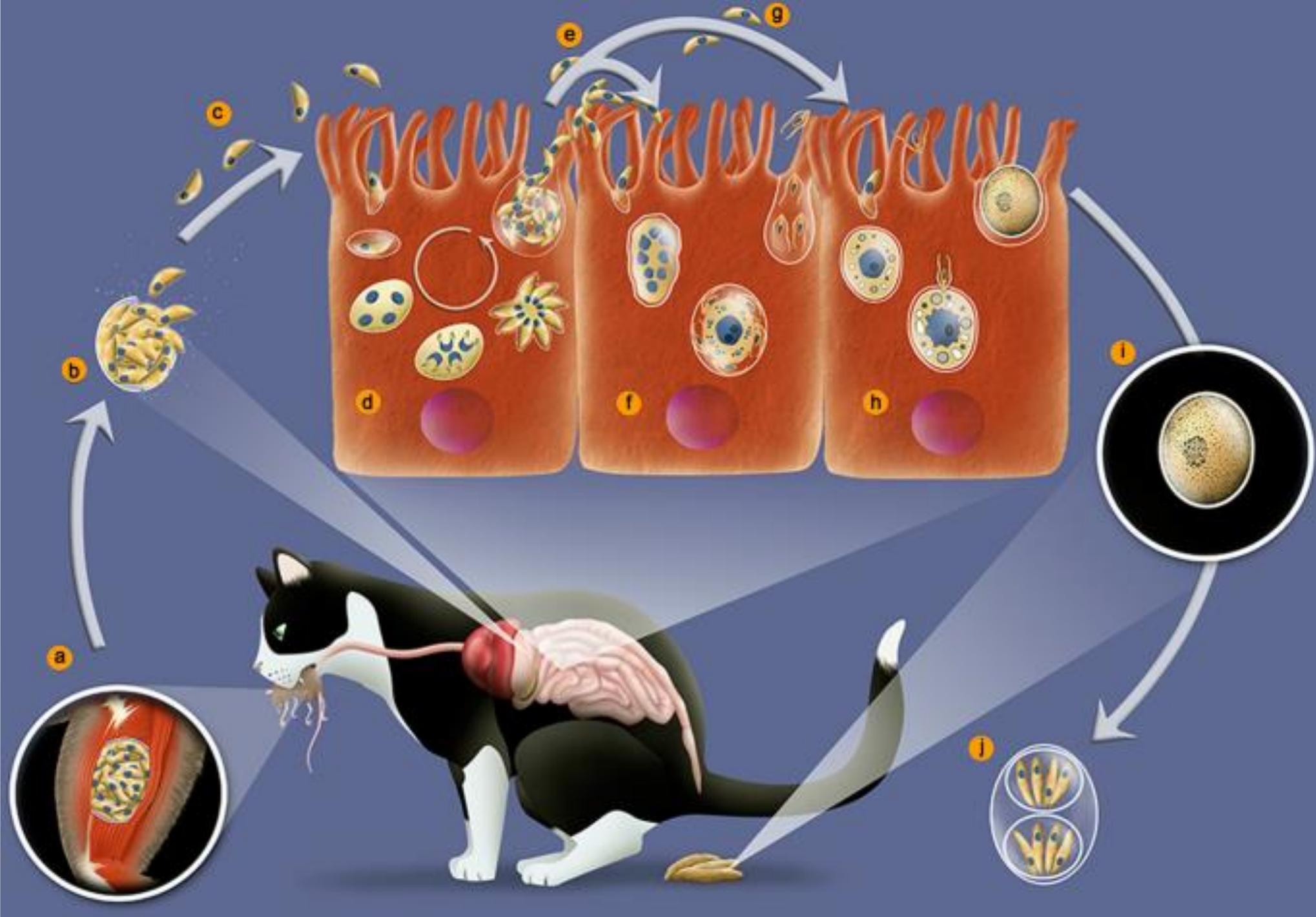


6. Transplacental route: the tachyzoites can be transmitted from infected pregnant woman to the fetus via the blood stream (placenta).

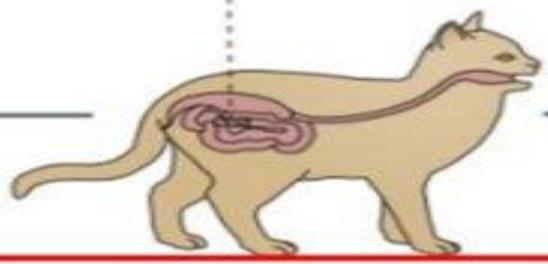
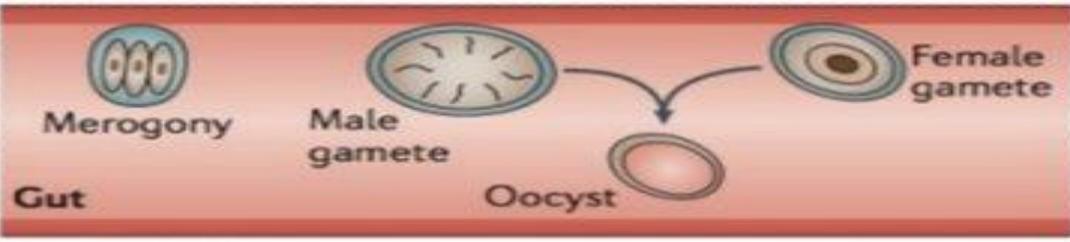
7. Sexually transmitted or by artificial insemination with semen from infected male.

Toxoplasma life cycle

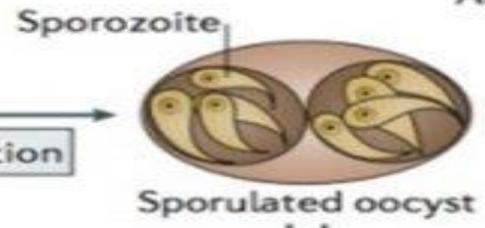




Sexual reproduction



Oocyst shedding



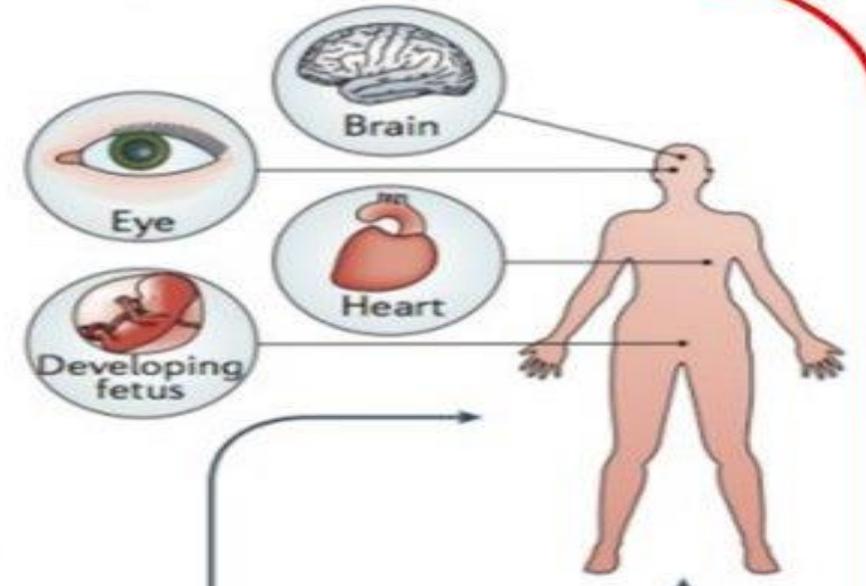
Sporulation



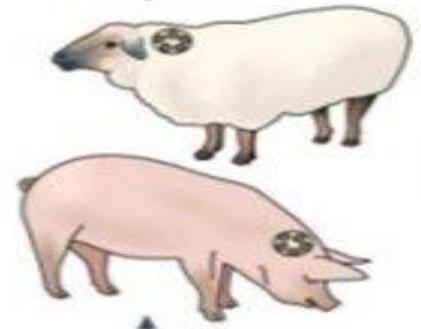
Stage conversion



Asexual reproduction



Food- or water-borne transmission



Environmental transmission

Pathogenesis of *Toxoplasmosis*

Proliferation of tachyzoites in the host cells causes cellular death with focal necrosis and surrounding inflammatory cells.



1. In acute infection: the outcome of the disease depends on host immune status.

a. In immunocompetent individuals: tachyzoites disappear from various organs.

b. In immunocompromised patients: the parasites disseminate through the blood stream to various organs (as brain, eyes, lungs, heart, liver, etc.), where they form **pseudocysts** causing severe necrotizing lesions.



2. In chronic infection:

- **True tissue cysts** remain viable in tissues for years in resting form.
- In immunodeficient status, their **reactivation** causes clinical disease.

Clinical picture of *Toxoplasmosis*

1. Congenital toxoplasmosis:

- This occurs when the mother gets infected for **the first time** during pregnancy.
But, in some woman with **chronic infection**, reactivation of tissue cysts leads to liberation of trophozoites, which may infect the fetus.
- The risk of fetal infection **rises** with **progress** of pregnancy.
- In contrast, the **severity** of fetal damage is high, when infection is transmitted in **early** pregnancy.

Clinical manifestations of congenital infections may be:

a. Early manifestations:

- Still birth, abortion, hydrocephalus, microcephaly and microphthalmia.
- **The most common sequelae** are retinochoroiditis that affects vision and results in blindness, cerebral calcification, convulsions (**clinical triad**).
- In some cases, fever, lymphadenopathy, hepatosplenomegaly (HSM), anemia, thrombocytopenia, petechial rash, jaundice, and myocarditis may present at birth.

b. Late manifestations:

Mental retardation, visual affection and psychomotor disturbance in adolescence and adulthood.

2. Acquired toxoplasmosis:

- It is asymptomatic in 80-90% of healthy hosts.
- The classical clinical sign of acute acquired toxoplasmosis is **lymphadenopathy** and the deep cervical lymph nodes are the most commonly affected. The infected lymph nodes are discrete and non-tender.
- Mild fever, headache, myalgia (Flu-like syndrome), and HSM are often present.

3. Toxoplasmosis in immunocompromised patients:

- In these patients, affection of **brain** is more common, with meningoencephalitis, and neuropsychiatric manifestations.
- Pneumonia, myocarditis, chorioretinitis and HSM may occur.

Diagnosis of *Toxoplasmosis*

A. Clinical diagnosis:

- A combination of signs as hydrocephalus or microcephaly, chorioretinitis and signs of intracerebral calcification make diagnosis of **congenital toxoplasmosis** probable.
- **Acquired toxoplasmosis** is diagnosed by exclusion from other diseases of the reticuloendothelial and lymphatic systems.

Diagnosis of *Toxoplasmosis*

B. Laboratory diagnosis:

1. Microscopy:

- Detection of **trophozoites, pseudocyst** and **tissue cysts** in smears stained by Giemsa, or PAS stain.

- blood
- lymph node
- Placenta
- CSF
- bone marrow
- amniotic fluid
- Spleen

Diagnosis of *Toxoplasmosis*

B. Laboratory diagnosis:

2. Animal inoculation:

- *Toxoplasma* can be detected by intraperitoneal inoculation of infective material in mice.
- After 7-10 days, peritoneal fluid is examined for **trophozoites**.
- Mice are sacrificed after 3 weeks and examined for **tissue cysts**.



Diagnosis of *Toxoplasmosis*

B. Laboratory diagnosis:

3. Serodiagnosis:

- a. **Sabin-Feldman dye test:** It detects a circulating cytoplasm modifying antibody.
 - Patient's **serum** is mixed with a ***Toxoplasma* trophozoites suspension** and **methylene blue** is added.
 - If the parasite fails to take the stain, the test is considered positive.

Diagnosis of *Toxoplasmosis*

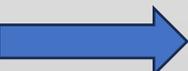
B. Laboratory diagnosis:

3. Serodiagnosis:

b. **Antibody detection:** For detection of IgM, IgG, and IgA **antibodies**.

- Tests used include ELISA, IFA, and IHA.

- Detection of specific **IgM** antibodies indicates  **acute infection**.

- Detection of specific **IgG** titer indicates  **latent infection**.

- Detection of **IgM** in **babies' blood** is  fetal in origin as maternal IgM doesn't cross the placenta.

- **IgA** is also used for detecting  congenital infection in newborns.

Diagnosis of *Toxoplasmosis*

B. Laboratory diagnosis:

3. Serodiagnosis:

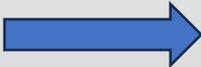
c. Antigen detection:

- Detection of antigen by ELISA indicates  recent *Toxoplasma* infection.
- It is useful in  diagnosis of congenital toxoplasmosis and toxoplasmosis in immunocompromised patients.

Diagnosis of *Toxoplasmosis*

B. Laboratory diagnosis:

4. *Toxoplasma* Molecular diagnosis:

- Can be used for diagnosis of *T. gondii* DNA in blood, CSF, urine, amniotic fluid, and different tissues.
- It is useful in  diagnosis of **congenital toxoplasmosis** and toxoplasmosis in **immunocompromised patients** (antibody titers are low or absent).

5. Imaging:

- MRI and CT scan: to diagnose **CNS involvement**.
- US of fetus: to diagnose **congenital toxoplasmosis**.



➤ Treatment :



1. Immunocompetent individuals:

- Most healthy people **recover** from toxoplasmosis **without treatment**.
- Persons who develop persistent, severe symptoms can be treated with a combination of drugs (such as **pyrimethamine** and **sulfadiazine** or **clindamycin**, plus **folinic acid**).



➤ Treatment :



2. Immunocompromised individuals:

- Immunosuppressed patients who are positive for *T. gondii* and have a **CD4+ T-lymphocyte count less than 100/ μ l** should receive prophylactic treatment against *Toxoplasma* encephalitis.
- Prophylaxis should be discontinued in patients whose CD4+ T-lymphocyte becomes **more than 200/ μ l for 3 months** after successful treatment.
- Drugs used in prophylaxis:
 - 1) Trimethoprim-sulfamethoxazole (**the drug of choice**).
 - 2) Dapsone- pyrimethamine.



➤ Treatment :



3. Pregnant women:

- **Spiramycin (Rovamycin)** should be taken for 4 weeks, to treat the infected pregnant women to reduce the risk of transplacental transmission.

4. Congenital toxoplasmosis:

- **Pyrimethamine** and **sulfadiazine** with **folinic acid** for one year.
- Systemic **corticosteroids** may be given to alleviate chorioretinitis.



➤ Prevention and control:



1. **Women** who are or may become **pregnant** should avoid contacts with cats or cleaning the litter box and undergo routine serological screening.
2. Individuals **at risk**, mainly children and immunocompromised individuals, should avoid contacts with cats and their feces.
3. Screening for *T. gondii* antibody should be done in all **blood banks**.



➤ Prevention and control:



4. Proper **washing** of hands, vegetables and fruits before eating.
5. Proper washing of hands and utensils after handling **raw meat**.
6. Proper freezing and cooking of **meat** before eating.
7. Never fed raw meat to **cats**; only dry, cooked or canned meat should be fed.
8. **Cats** should be kept indoors, and litter boxes changed daily. Cats' feces should be flushed down the toilet or burned. Litter pans should be cleaned by immersing them in boiling water.

MCQ1: A young lady works in medical laboratory. She had been married 3 years ago, and she got pregnant and aborted twice.

What is the probable parasitic infection?

a) *Trypanosoma brucei*

b) *Onchocerca volvulus*

c) *Toxoplasma gondii*

d) *Trichomonas vaginalis*

Schistosoma mansoni

MCQ 2: What is the most prominent *Toxoplasma* stage detected in samples taken from immunocompromised patients?

a) Oocysts

b) Pseudocysts

c) Sporocyst

d) Sporozoite

e) True tissue cysts



Discussion & Feedback



10 minutes