



Lab-6

Toxoplasma Gondii

Toxoplasma gondii is an obligate intracellular coccidian parasite.

Definitive host: Cats and other felines, in which both sexual and asexual cycle takes place.

Intermediate hosts: Man and other mammals, in which only the asexual cycle takes place. Human infection occurs by ingestion of food containing oocyst and tissue cyst. -Congenital infection can also occur.

Morphology

T. gondii occurs in 3 forms :

- Trophozoite
- Tissue cyst
- Oocyst
- ❖ The trophozoite and tissue cyst represent stages in asexual multiplication (**schizogony**), while the the oocyst is formed by sexual reproduction (**gametogony or sporogony**).

- ❖ All 3 forms occur in domestic cats and other felines, which are the definitive hosts and support both schizogony and gametogony.
- ❖ Only the asexual forms, trophozoites and tissue cysts are present in other animals, including humans and birds, which are the intermediate hosts.
- ❖ All the 3 forms are infectious to man.

Trophozoites (Tachyzoites)

The trophozoite is crescent shaped, with one end pointed and the other end rounded.

- The nucleus is ovoid and is situated at the blunt end of the parasite.
- Electron microscopy reveals an **apical complex** at the pointed end.
- The trophozoite stains well with Giemsa stain
- They are found during acute stage of the infection

Tissue cyst

Tissue cysts are the resting form of the parasite

- They are found during chronic stage of the infection and can be found in the brain (most common site), skeletal muscles, and various other organs.
- The cyst wall is eosinophilic and stains with silver, in contrast to the pseudocyst.

- The cyst is round or oval, 10–20 μm in size and contains numerous **bradyzoites**.

Oocyst

Oocysts develop only in definitive hosts – in the intestine of cats and other felines but not in humans.

- It is oval in shape and measures 10–12 μm in diameter.
- Each cyst is surrounded by a thick resistant wall.
- The oocysts is formed by sexual reproduction (gametogony).

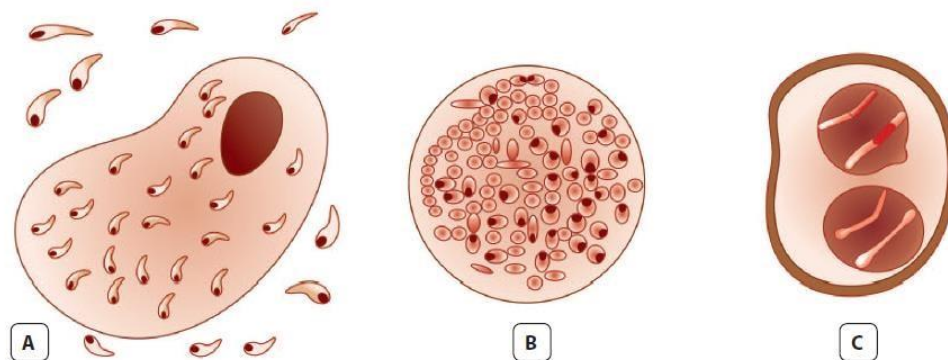
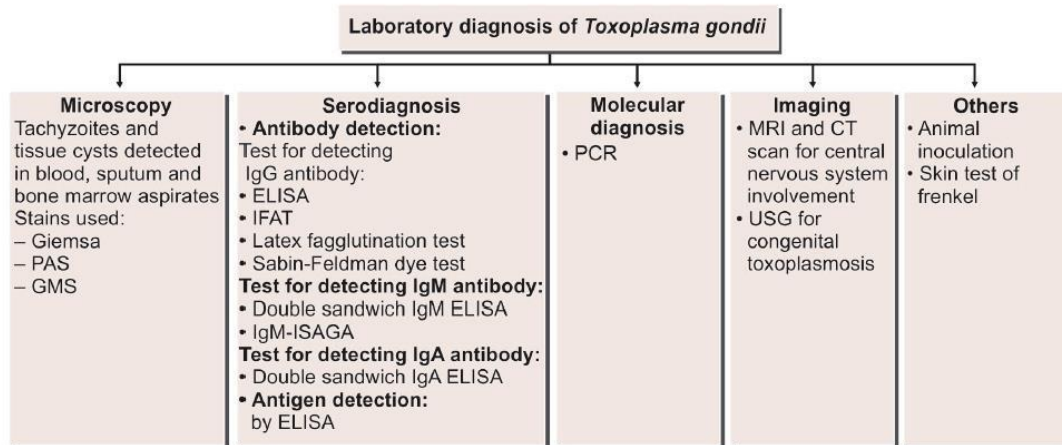


Fig.1: *Toxoplasma gondii*. **A. tachyzoites**—extracellular trophozoites and intracellular form within macrophage; **B. tissue cyst** containing rounded forms bradyzoites; **C. Oocyst containing** 2 sporocysts with sporozoites

Laboratory Diagnosis

The diagnosis of acute toxoplasmosis is made mainly by demonstration of trophozoites and cysts in tissue and body fluids and by serology:



- Microscopy

Animal Inoculation

Toxoplasma can be isolated by inoculating body fluids ,blood, or tissue specimens by intraperitoneal inoculation in mice or in tissue culture. Mice should be examined for Toxoplasma in their peritoneal exudate after 7–10 days of inoculation.

- Serodiagnosis

Serology is the main stay for diagnosis of toxoplasmosis.

- Antibody detection

Diagnosis of acute infection with *T. gondii* can be made by detection of the simultaneous presence of IgM and IgG antibodies.

- Antigen detection

Detection of antigen by ELISA indicates recent Toxoplasma infection.

- In AIDS and other immunocompromised patients, antigen detection is very useful.

- **Skin test of Frenkel**

Diluted toxoplasmin is injected intradermally and delayed positive reaction appears after 48 hours. This test is not very reliable for diagnosis of toxoplasma.

- **Molecular Methods**

DNA hybridization techniques and polymerase chain reaction (PCR) are increasingly used to detect Toxoplasma from different tissues and body fluids.

- **Imaging**

Magnetic resonance imaging (MRI) and computed tomography (CT) scan are used to diagnose toxoplasmosis with central nervous system involvement.

- Ultrasonography (USG) of the fetus in utero at 20–24 weeks of pregnancy is useful for diagnosis of congenital toxoplasmosis.