

## Medical parasitology

### Sporozoa

Sporozoa belong to the phylum Apicomplexa .It contain two classes namely Haematozoa ( genus Plasmodium) and Coccidea which either undergo whole of their life cycle in a single host(e.g.Cryptosporidium) divide a similar cycle between two hosts (e.g. Toxoplasma gondii).

### Toxoplasmosis

Is a parasitic disease caused by the protozoan *Toxoplasma gondii*. The parasite infects most genera of warm-blooded animals, including humans, but the primary host is the felid (cat) family. Animals are infected by eating infected meat, by ingestion of feces of a cat and by transmission from mother to fetus. Cats are the primary source of infection to human hosts, although contact with raw meat, especially lamb, is a more significant source of human infections in some countries. Fecal contamination of hands is a significant risk factor.

### Geographical Distributions

Up to a third of the world's human population is estimated to carry a *Toxoplasma* infection. The Centers for Disease Control and Prevention notes the overall seroprevalence in the United States as determined with specimens collected by the (National Health and Nutritional Examination Survey ) between 1999 and 2004 was found to be 10.8%, with seroprevalence among women of childbearing age (15 to 44 years) 11%. Another study placed seroprevalence in the US at 22.5%. The same study claimed a seroprevalence of 75% in El Salvador. Official assessment in Great Britain places the number of infections at about 350,000 a year. In 2006, a Czech research team discovered women with high levels of toxoplasmosis antibodies were significantly more likely to have baby

boys than baby girls. In most populations, the birth rate is around 51% boys, but women infected with *T. gondii* had up to a 72% chance of a boy.

### Life cycle :

1-The cat becomes infected upon ingestion of a contaminated rodent with cyst ( Bradyzoites) found in the brain and muscle tissue.

2- Bradyzoites release in the cat quickly transform into Tachyzoite..

3- Both sexual cycle and asexual cycle reproduction occur in the gut of the cat.

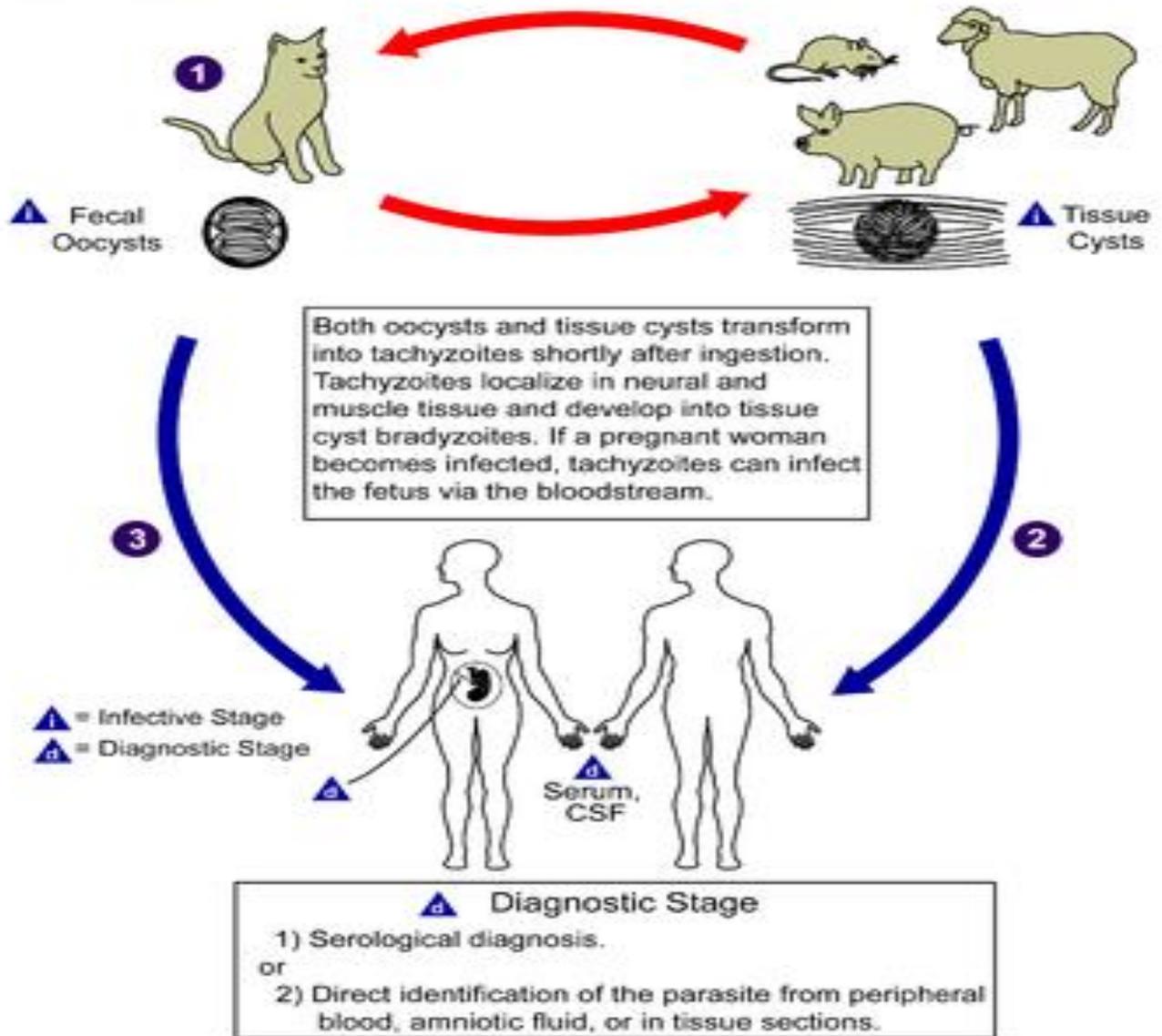
4- The sexual cycle results in the production of immature cyst(Oocyst). complete their maturation outside . These oocyst contain two sporocysts each of which encloses four sporozoites.

5- Rodents ingesting the infected stage (mature oocyst),the sporozoites emerge from the mature oocysts, and rapidly convert into actively growing 'Tachyzoite' in the intestinal epithelium of the rodents then dividing and distributed throughout the host body invading the brain or muscle of the intermediate host where they form cysts filled with 'Bradyzoites'

6- In human , swelling the oocyst initiate the extra-intestinal asexual cycle of development, which occur mainly in macrophages. The sporozoites emerging from the ingested oocyst in the small intestine pass through the mucosa and phagocytosed by, or actively enter macrophages . They divide until they fill the host cell which then liberates them and they reinvade other macrophage. The parasite in this phase of development are called " **Tachyzoites**". The parasite enters other cells ( muscle cell, neuron, others ) and secreting a thin wall around itself protected from the host's antibodies ,the parasites multiply slowly and hence are now known as (Bradyzoites )

# Toxoplasmosis

(*Toxoplasma gondii*)



## **Pathogenesis (Signs and symptoms)**

Infection has three stages:

### **1-Acute toxoplasmosis**

During acute toxoplasmosis, symptoms are often influenza-like, swollen lymph nodes, or muscle aches and pains that last for a month or more. Young children and immunocompromised people, such as those with HIV/AIDS, may develop severe toxoplasmosis, this can cause damage to the brain (encephalitis) or the eyes (necrotizing retinochoroiditis). Infants infected via placental transmission may be born with either of these problems, or with nasal malformations,

### **2-Latent toxoplasmosis**

It is easy for a host to become infected with *Toxoplasma gondii* and develop toxoplasmosis without knowing it. In most immunocompetent people, the infection enters a latent phase, during which only bradyzoites are present, forming cysts in nervous and muscle tissue. Most infants who are infected while in the uterus have no symptoms at birth, but may develop symptoms later in life.

### **3-Cutaneous toxoplasmosis**

While rare, skin lesions may occur in the acquired form of the disease, including rosella and erythema multiforme-like eruptions, nodules, urticaria, and maculopapular lesions. Newborns may have punctate macules, or "blueberry muffin" lesions. Diagnosis of cutaneous toxoplasmosis is based on the tachyzoite form of *T. gondii* being found in the epidermis.

### **Transmission to human may occur through:**

. Ingestion of raw or partly cooked meat, especially pork, lamb, or venison containing *Toxoplasma* cysts: Infection prevalence in countries where undercooked meat is traditionally eaten has been related to this

transmission method. Tissue cysts may also be ingested during hand-to-mouth contact after handling undercooked meat, or from using knives, utensils, or cutting boards contaminated by raw meat.

. Ingestion of unwashed fruits or vegetables that have been in contact with contaminated soil containing infected cat feces

. Ingestion of contaminated cat feces: This can occur through hand-to-mouth contact following gardening, cleaning a cat's litter box, contact with children's sandpits; the parasite can survive in the environment for over a year

. Acquiring congenital infection through the placenta.

### **Prevention and control**

Prevention consist of avoiding the ingestion of Oocysts or tissue cysts and avoiding cats especially their handling. Pregnant women should avoid handling raw meat, drinking raw milk (especially goat milk) and be advised to not eat raw or undercooked meat regardless of type .Because of the obvious relationship between Toxoplasma and cats it is also often advised to avoid exposure to cat feces, and refrain from gardening (cat feces are common in garden soil or at least wear gloves when so engaged).

### **Treatment:**

Treatment is very important for recently infected pregnant women, to prevent infection of the fetus. Since a baby's immune system does not develop fully for the first year of life, and the resilient cysts that form throughout the body are very difficult to eradicate with antiprotozoans, an infection can be very serious in the young. Acute postnatal toxoplasmosis can be treated with a mixture of pyrimethamine and sulphenamides