

Coccidia

Kingdom	Protista
Sub-Kingdom	Protozoa
Phylum	Apicomplexa
Class	Sporozoasida
Order	Eucoccidioside
Family	Sarcocystidae
Genus	<i>Toxoplasma</i>
Species	<i>gondii</i>

Toxoplasma gondii (life cycle)

- **Sexual cycle** in the intestinal epithelium of the definitive host (cat)
- **Asexual cycle** in the intermediate host (birds, rodents, other mammals, humans)

In humans: 2 forms

Tachyzoites (trophozoites)	Cysts
Rapidly proliferating Usually seen at the beginning of infection	Resting forms, found in muscles & brain, They contain bradyzoites from 8-10 days after entry Resistant to pepsin, usually found in chronic infections

***Toxoplasma gondii* (life cycle)**

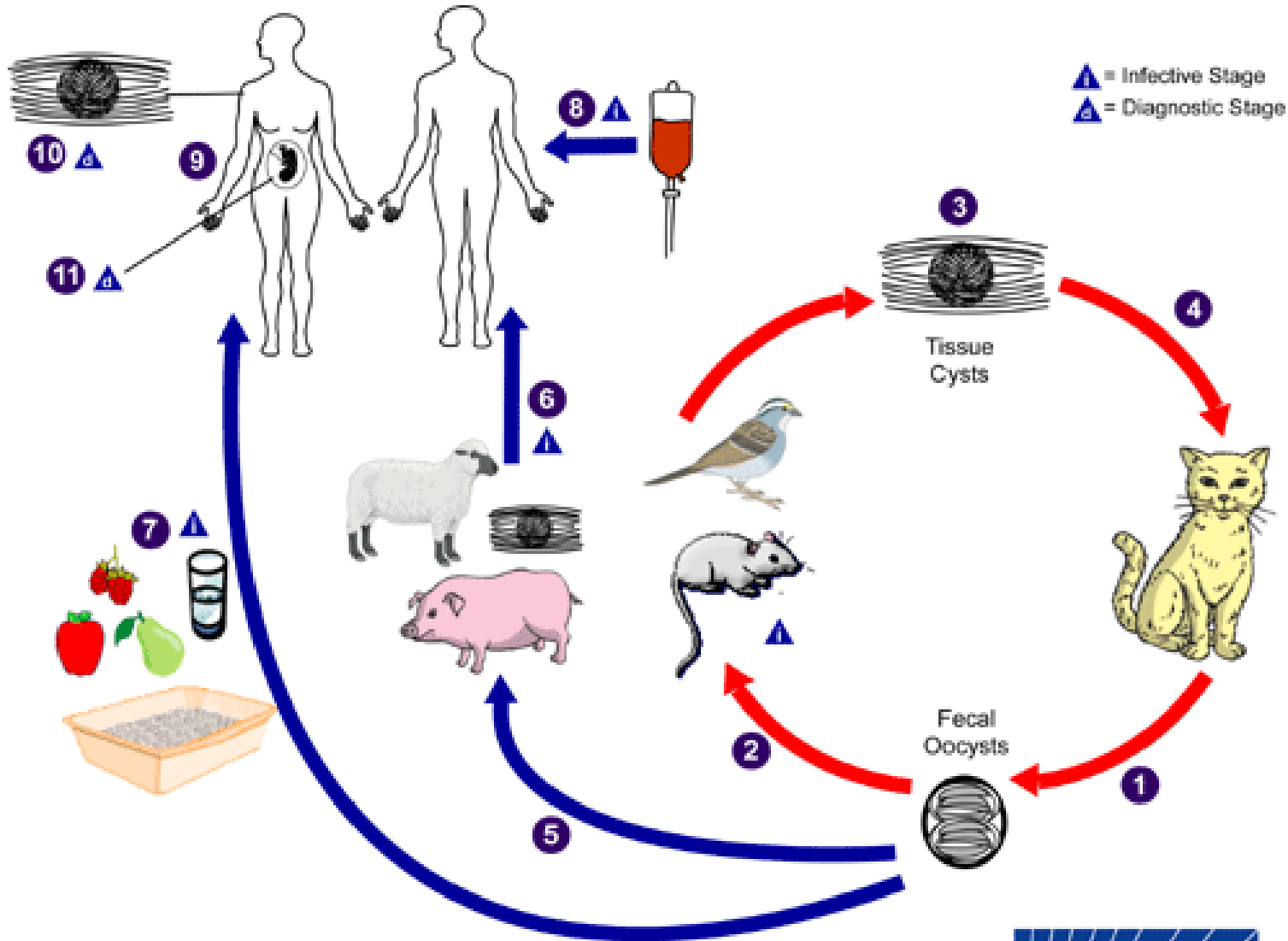
Humans can become infected by any of several routes:

- 1. Eating undercooked meat of animals harboring tissue cysts**
- 2. Consuming food or water contaminated with cat faeces or by contaminated environmental samples (such as fecal-contaminated soil)**
- 3. Blood transfusion or organ transplantation**
- 4. Transplacentally, from mother to fetus**

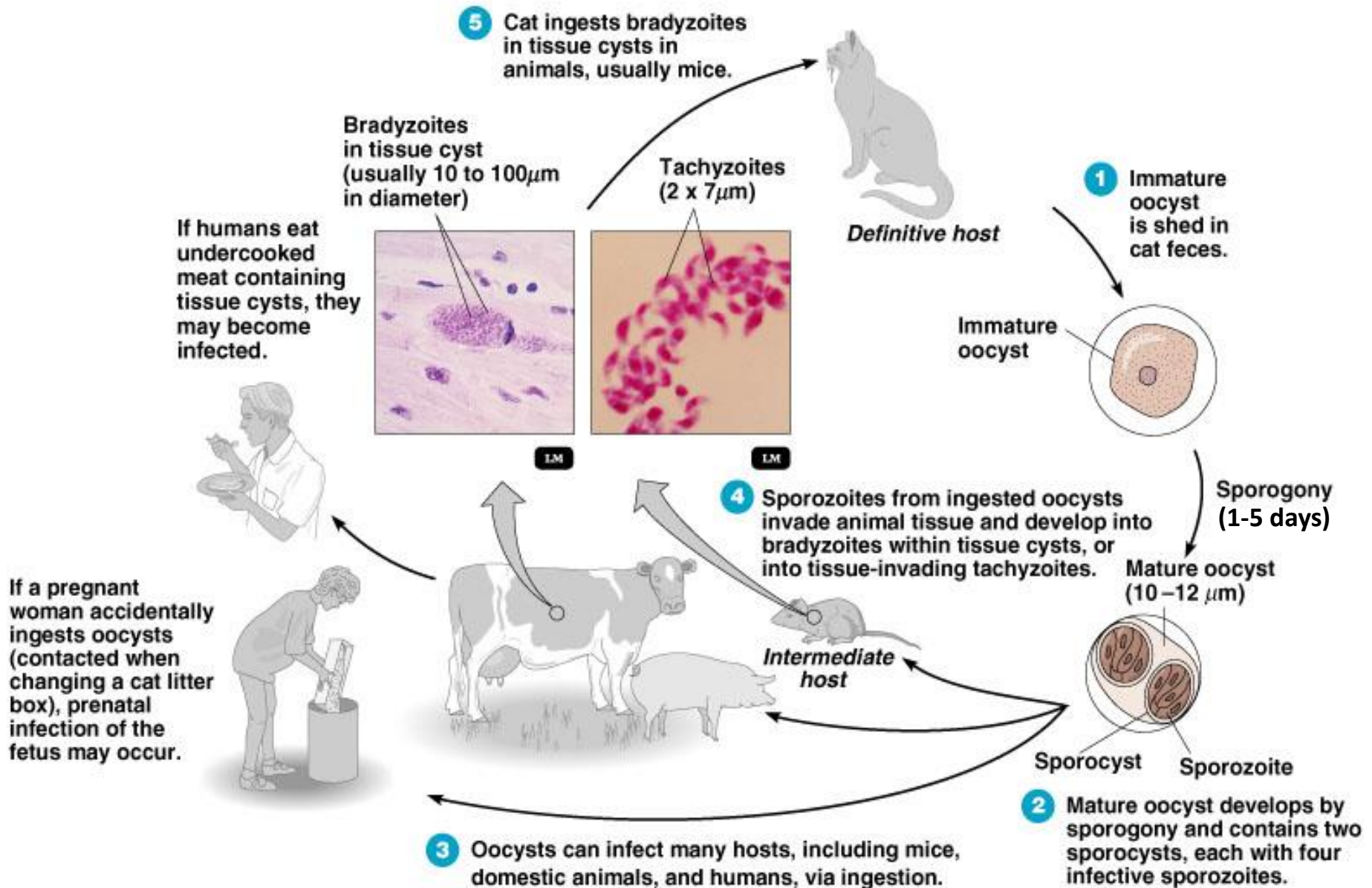
In the human host, the parasites form tissue cysts, mostly in skeletal muscle, myocardium, brain, and eyes. These cysts may remain throughout the life of the host.

Toxoplasma gondii

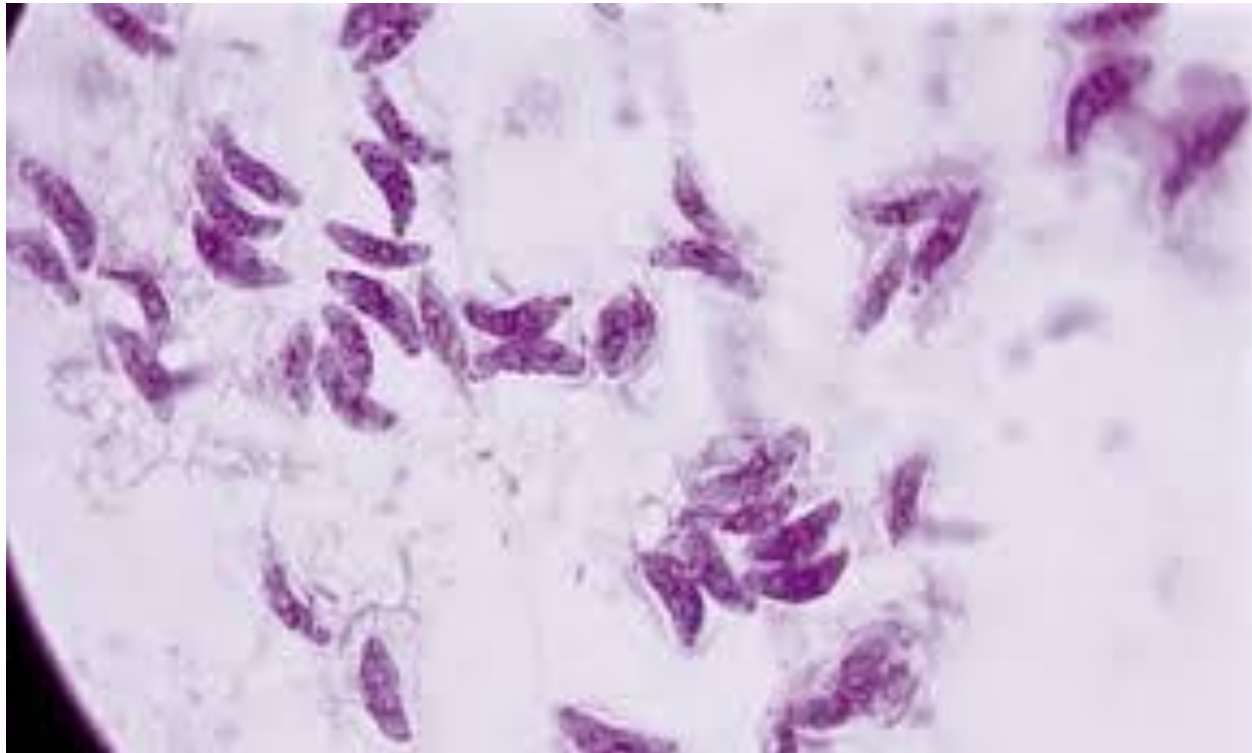
Life cycle



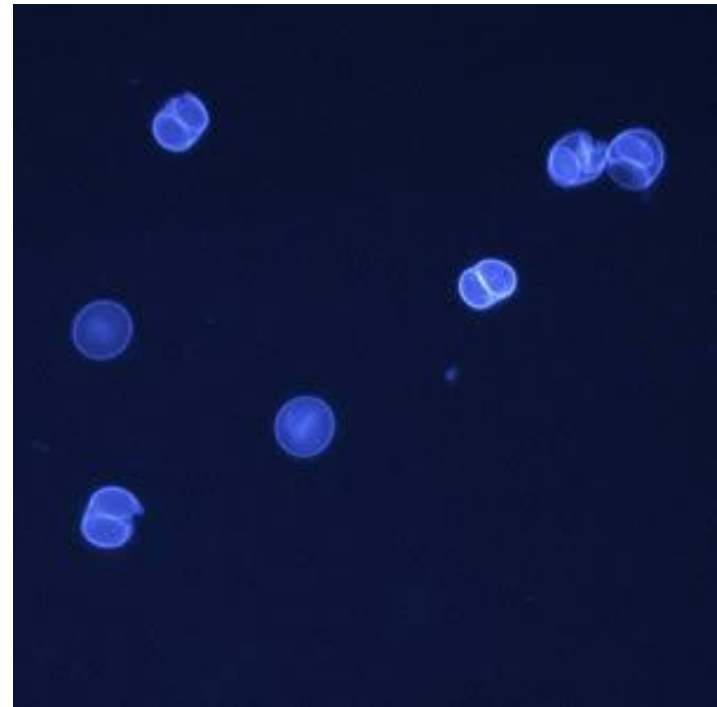
Toxoplasma gondii - Life cycle



***Toxoplasma gondii*. Tachyzoites from the peritoneal exudates of infected mice stained with Giemsa ($\times 100$)**



Left: Unsporulated *T. gondii* oocyst in an unstained wet mount (CDC)



**Right: *T. gondii* sporulated and unsporulated oocysts,
UV fluorescence microscopy (CDC)**

Toxoplasma gondii

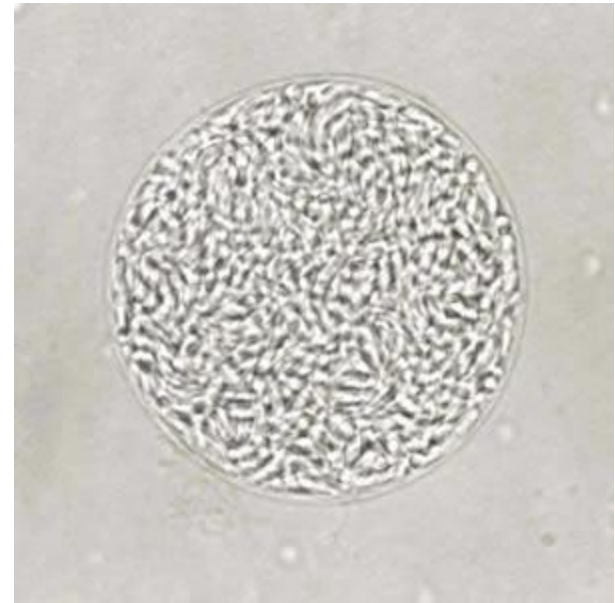
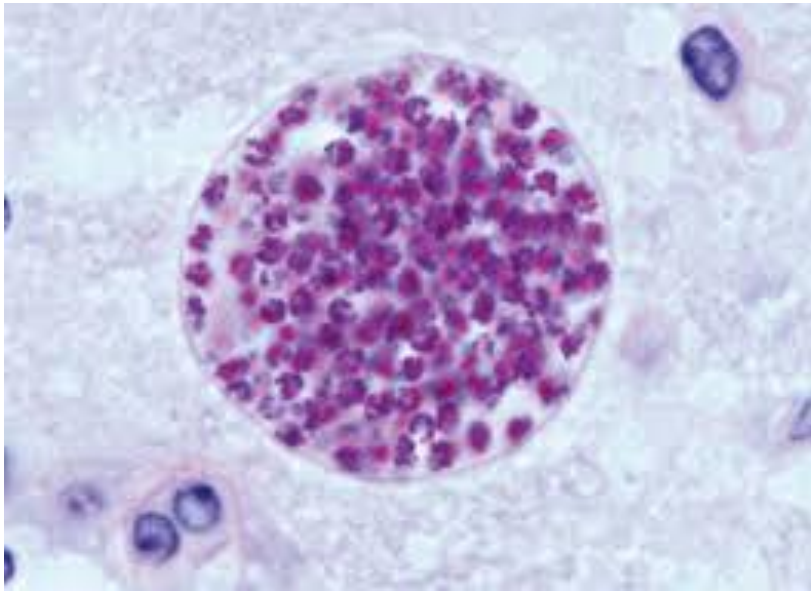
Clinical manifestations

- Immuno-competent patient
- Congenital infection
- Ocular toxoplasmosis
- Toxoplasmosis and AIDS
- Transplant recipients

Ocular toxoplasmosis: Peripheral retinochoroiditis (CDC)

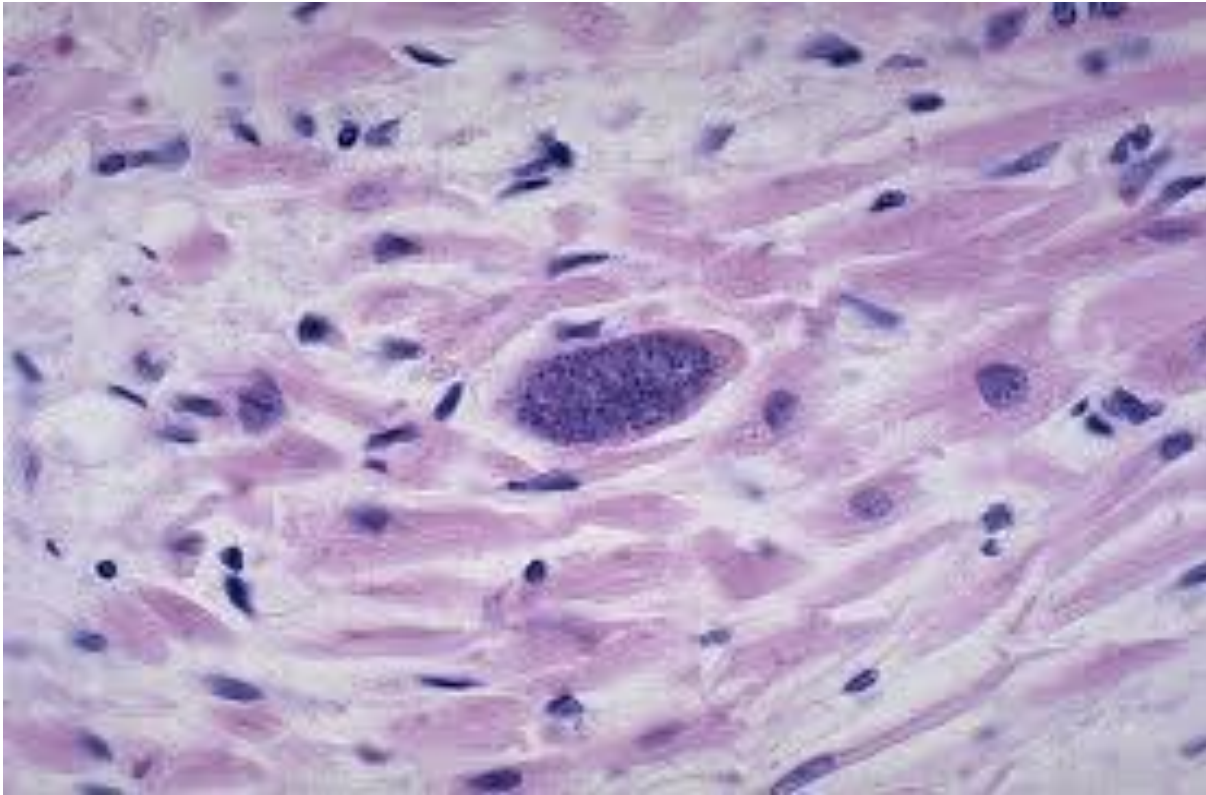


***T. gondii* tissue cyst in a mouse brain,
individual bradyzoites can be seen within**



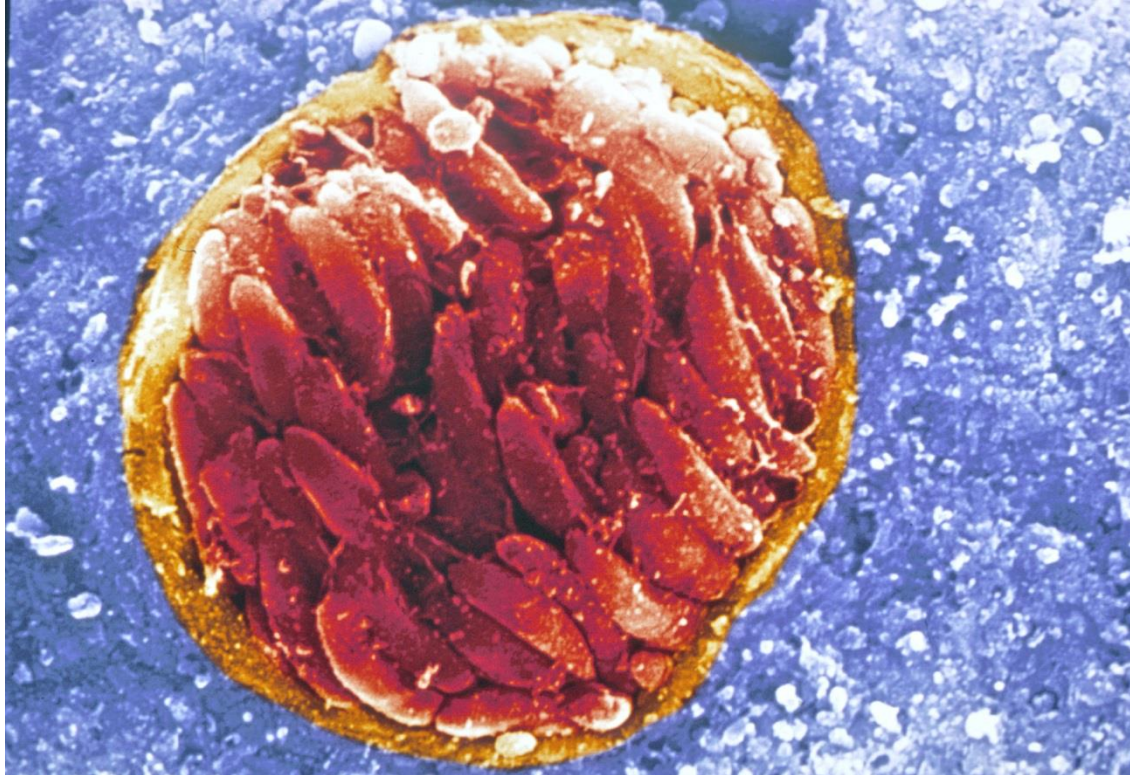
**Unstained *T. gondii* tissue cyst
(CDC)**

***Toxoplasma gondii* infection can also occur in the heart. Here a pseudocyst appears in myocardium**



***Toxoplasma gondii*, tissue cyst in brain**

(Photo: D. Ferguson)



Toxoplasma gondii

Immunology

- **Predominantly cell-mediated**
- **Mostly activated macrophages & T-cells then**
- **Production of interferon γ and cytokines**
- **Specific Ab against extracellular parasites**

- **Primary infection leads to specific and definitive protection against reinfection !!**

Toxoplasma gondii

Diagnosis

- **Clinical diagnosis not reliable!**
- **Observation of parasites in patient specimens, such as bronchoalveolar lavage material from immunocompromised patients or lymph node biopsy.**
- **Isolation of parasites from blood or other body fluids, by intraperitoneal inoculation into mice or tissue culture. Long process!**
- **Detection of parasite genetic material by PCR, especially in detecting congenital infections in utero.**
- **Serologic testing is the routine method of diagnosis. The detection of *Toxoplasma*-specific antibodies is the primary diagnostic method to determine infection with *Toxoplasma***

Toxoplasma gondii

Management

Type	Management
Immuno-competent people	Usually not treated (toxicity of drugs) If severe, sulfadiazine + pyrimethamine + folinic acid
Pregnant women	Spiramycin (3g/d) to diminish risk of transplacental passage. If fetal infection, sulfadiazine + pyrimethamine + folinic acid, followed by spiramycin
Congenital infection	Sulfadiazine + pyrimethamine + folinic acid (3 weeks) then spiramycin until one year of age
Ocular disease	Observation for > 1 year If inflammation, Sulfadiazine + pyrimethamine + folinic acid + systemic corticosteroids (No consensus!)
Toxoplasmosis & AIDS	Acute therapy, sulfadiazine + pyrimethamine (double dose) + folinic acid for 6 weeks. Clindamycin if toxicity then reduced dose for maintenance therapy
Organ(s) transplant	If organ is +, pyrimethamine prophylaxis for 6 weeks after operation. If established disease, then acute therapy