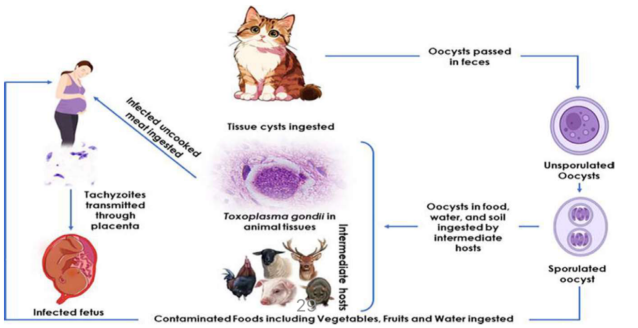
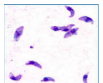
Feature	Toxoplasmosis	Lymphatic Filariasis
Disease Name	Toxoplasmosis infectious disease	Lymphatic Filariasis
Other Names		Elephantiasis
Epidemiology	Found worldwide, more common in tropical regions	120 million patients infected worldwide as of 2019; Tropical and subtropical climates (West & Central Africa, South America); 10:1 predilection for men over women
Pathogen	*Toxoplasma gondii* (obligate intracellular, single-celled protozoan)	Filarial nematodes (Wuchereria bancrofti, Brugia malayi) (responsible for most cases)
Etiology - Life Cycle: Definitive Host	Cats completes its sexual reproduction only in cats, shedding oocysts in their faeces.	Humans
Etiology - Life Cycle: Oocysts	Shed in cat feces, sporulate and become infectious	[redacted]
Etiology - Life Cycle: Transmission	Ingestion of mature oocysts from contaminated sources	Infected mosquito introduces L3 larvae into skin → Adult
Etiology - Life Cycle: Tachyzoites	Transform from oocysts, fast-replicating, crescent-shaped, disseminate to skeletal muscle, myocardium, brain, and eyes	• **Microfilariae:** • Produced by adult nematodes • Found in the peripheral blood of the human host • Microfilariae have nocturnal periodicity (10 p.m. to 2 a.m.).
Etiology - Life Cycle: Bradyzoites	Develop from tachyzoites, form tissue cysts, remain dormant for years, killed by freezing and cooking	[redacted]
Etiology - Life Cycle: Larvae	N/A	• Microfilariae that lose their sheaths • Microfilariae mature into larvae inside the mosquito: L1 (1st stage) larvae to L3 (3rd stage) larvae • Maturity reached in 6–9 months
Etiology - Life Cycle: Adults	N/A	L3 larvae mature into adults in regional lymphatics
Mode of Transmission	• Oral route: • Ingestion of oocysts passed cat faeces • Ingestion of infected raw or insufficiently cooked meat (tissue cyst form) (most common) • Unpasteurized milk (especially goat milk) • Blood transfusion or organ transplantation • Vertical transmission (Transplacental transmission)	Female mosquito bite (Aedes spp., Anopheles spp., Culex spp., Mansonia spp.) (*W. bancrofti* is transmitted by many different mosquito species depending on geographical distribution. Among them are:
Clinical Presentation: Immunocompetent Host	Mainly asymptomatic (~90%), symptomatic (<10%): mononucleosis-like symptoms bilateral cervical adenopathy.	Often asymptomatic (subclinical), some show acute and/or chronic signs
Clinical Presentation: Immunosuppressed Patients	• Symptoms of encephalitis in cerebral toxoplasmosis • Visual impairments and pain in ocular toxoplasmosis AIDS	N/A
Clinical Presentation: Fetus/Newborn/Infant	• Fetus, newborn, or infant→ Congenital toxoplasmosis: • First trimester: • Increased risk of premature birth and spontaneous abortion • Classic triad of toxoplasmosis • Chorioretinitis (a form of posterior uveitis) • Diffuse intracranial calcifications • Hydrocephalus • Second or third trimester: subclinical or mild toxoplasmosis	N/A
Clinical Presentation: Sequelae of Congenital Toxoplasmosis	Epilepsy, intellectual disability, visual disabilities (chorioretinitis) sensorineural hearing loss	N/A
Clinical Presentation: Acute Phase	N/A	Filarial antigens trigger increased cytokines and immunoglobulins (IgE and IgG4). Recurrent attacks of lymphangitis and lymphadenitis due to Toxic products of living or dead adult worm Mechanical irritation by adult worm Allergic reaction to adult products or died worms 2° bacterial infection



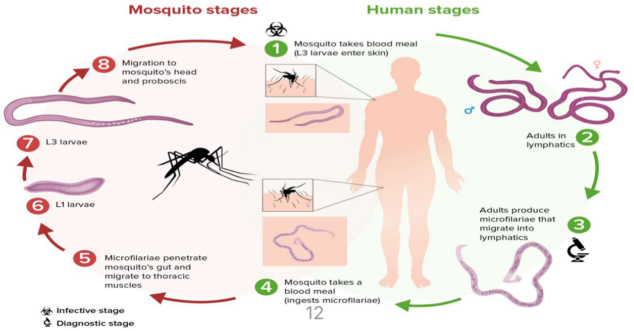
1. Cats are the definitive hosts for *T. gondii*. The parasite completes its sexual reproduction only in cats, shedding oocysts in their faeces.
2. Once expelled into the environment, the oocysts sporulate (mature) and become infectious.
3. Humans, and various animals become infected by ingesting mature oocysts from contaminated sources, leading to infection.
   - This can occur through consuming contaminated food, water, or soil, or handling cat litter without proper hygiene.
4. Once ingested, the oocysts transform into tachyzoites, which are: Obligate intracellular fast-replicating form, Crescent-shaped form with a central nucleus.

   tachyzoites → multiply rapidly in GI cells → rupture cells
4. Tachyzoites are transported in the lymphatics and disseminate in the bloodstream to: Skeletal muscle, Myocardium, Brain, and Eyes
   - localize in neural and muscle tissues → develop into tissue cysts
   - Immune system generally controls the replication of tachyzoites.



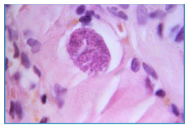
Osporo
Tachy
Brady

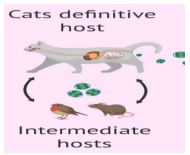
W. bancrofti



1. An infected mosquito introduces L3 larvae into the skin of the human host.
2. L3 larvae migrate to the lymph nodes and regional lymphatics and mature into adults, which have a predilection for inguinal lymph nodes.
3. Adult worms undergo sexual reproduction, with females birthing microfilariae that migrate actively through lymph and blood.
4. A mosquito ingests the microfilariae during a blood meal → Within the mosquito, the microfilariae develop into L1 larvae.
5. L1 larvae subsequently develop into L2 then L3 infective larvae

7. The tachyzoites forms a thick wall around itself converting into bradyzoites (tissue cyst)
   - Resistant to digestive enzymes
   - Bradyzoites develop cysts and remain dormant → can remain dormant for years
   - Killed by freezing and normal cooking temperatures
8. Cat consumes an infected intermediate host's tissue that harbour tissue cysts → organism undergoes sexual cycle → cycle continues



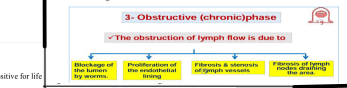


Clinical Presentation:
Chronic Phase

A. Filarial fever: Typically, low-grade fever (self-limiting). May have myalgias, +/- Lymphadenopathy.
B. Acute adenolymphangitis (ADL):
- Fever and lymphadenopathy
- Lymphangitis (inflammation spread distally to the lymph node), with lymphatic vessels in the legs) becoming warm, enlarged, red, and tender
- Commonly seen in inguinal lymph nodes but can also affect the genitalia (epididymitis in males)
- Lasts a few days then resolves, but recurs periodically

C. Tropical pulmonary eosinophilia (TPE): Immune reaction to microfilariae trapped in the lungs results in Restrictive lung disease, which can progress to interstitial pulmonary fibrosis

- Chronic and repeated infections lead to: Granuloma formation, and Fibrosis of lymphatic vessels and the surrounding connective tissue
- Effects:
  - Contractile dysfunction and lymphatic occlusion, causing lymphedema
  - Susceptibility of the human host to bacterial and fungal infections, which further contribute to tissue damage



Diagnosis

- **Serology**
  - IgM antibody test: positive within first week of acute infection
  - IgG antibody test: positive 2 weeks following infection and remains positive for life
- **PCR**
  - Detects parasite DNA
  - Amniotic fluid for suspected intrauterine disease
- **Additional diagnostics**
  - CT/MRI of the brain for suspected cerebral toxoplasmosis
  - Brain imaging may be performed if CNS or congenital toxoplasmosis is suspected.

A. Peripheral blood smear: blood smear obtained at night (with Giemsa stain): detection of microfilariae
B. Circulating filarial antigen (*W. bancrofti*): detects antigens of adult filarial worms. May be positive even in those without microfilariae
C. Anti-filarial antibody tests: elevated levels of anti-filarial IgG4 in the blood. Used mostly for travellers (who are not from endemic areas)
D. Imaging (Ultrasonography): Reveals adult worms moving in lymphatic vessels.
The "filarial dance sign"
an irregular worm movement pattern—may be detected on Doppler

Treatment

- Immunocompetent patients do not usually require treatment.
- Indications include immunosuppression, pregnancy, and severe infection (e.g., active ocular toxoplasmosis).

A. Filariasis without co-infection:
- Diethylcarbamazine (DEC): 1st-line therapy, Single dose
- Doxycycline in addition to DEC → For nonpregnant adults and children > 8 years of age

B. Surgical treatment:
- Skin debulking and lymphovenous anastomosis for drainage improvement
- Surgical excision of hydrocele

Prevention

- General advice:
  - Wash hands after handling raw meat or cat litter.
  - Thoroughly cook meat.
- Pregnant patients:
  - Avoid cats.
  - Do not clean litter boxes (if unavoidable, wear gloves).

Mosquito control

A. Lymphedema:
- Chronic swelling of the limb from chronic inflammation of the lymphatic vessels
- Graded based on the extent and progression of the symptoms: From Grade 0: subclinical to Grade III: nonpitting oedema with skin thickening and overgrowths, **non-reversible** (elephantiasis)

Acute

B. Chronic Hydrocele: the accumulation of fluid in the scrotal sac. It can impact their fertility, and mobility.
C. Renal involvement: Chyluria (milky urine):
- Normally, lymphatic vessels have no communication with the urinary tract.
- In filariasis, fluid with intestinal lymph leak into the urine intermittently. Leads to protein loss.

is a chronic
mosquito-borne infection
targeting the lymphatics,
caused by filarial nematodes.

Nematodes (roundworms) are long, thin, unsegmented, tube-like worms. Adult worms : form separate sexes, with the males usually being smaller than the females.

•Pathological lesions occur in the lymphatic system, due to the presence of adult worms (living or dead), but not due to microfilariae.

• Symptoms may take 9 months up to 1 year to manifest after the initial infection.

• Children or individuals in endemic areas often remain asymptomatic (subclinical infection), while others show acute and/or chronic signs and symptoms.