Protozoa 4
Toxoplasmosis

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Objectives

- Scientific name of the causative organism
- morphology, life cycle, modes of transmission
- Clinical disease patterns & pathogenesis
- Diagnosis
- Treatment
- Epidemiology (global & local)
- Principles of prevention

Toxoplasmosis

- Causative organism : *Toxoplasma gondii*
- Coccidian
- 3 major genotypes (Type I, II & III)
- Zoonosis – cats & felines- definitive hosts

- rodents, farm animals & man are intermediate host

Opportunistic infection

Morphology

Several forms:

- Oocyst

Size 10-13µm

2 sporocysts

each with 4 sporozoites

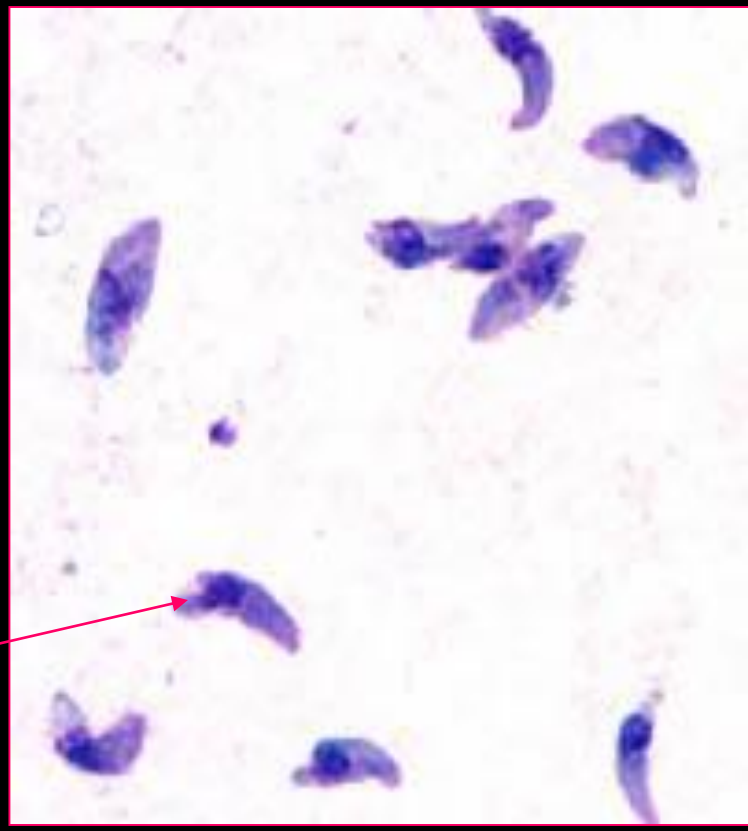
Excreted by cats

Morphology cont…

Tachyzoites (endozoites)

- Intracellular stage
- Curved, crescentic in shape
- Central nucleus
- Size 3-6µm
- Multiply actively inside host cells

Forming pseudocysts

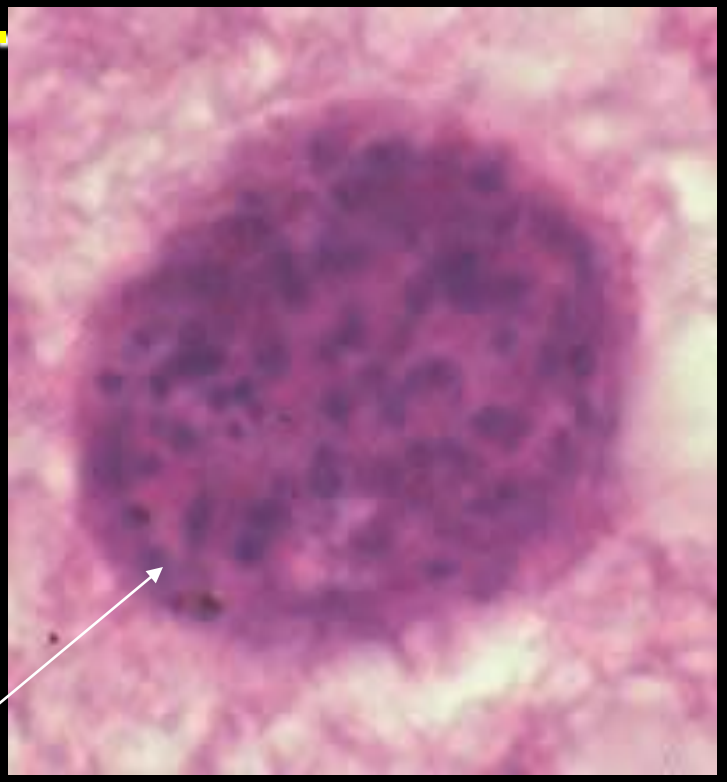


Geimsa stained smear

Morphology cont……

Tissue cyst

- Occur in human tissues (myocardium, skel. muscle & brain) & animal flesh
- Size: 10-100µm
- Contain~50-60,000 bradyzoites
- Dormant stage



Life cycle of *T. gondii*

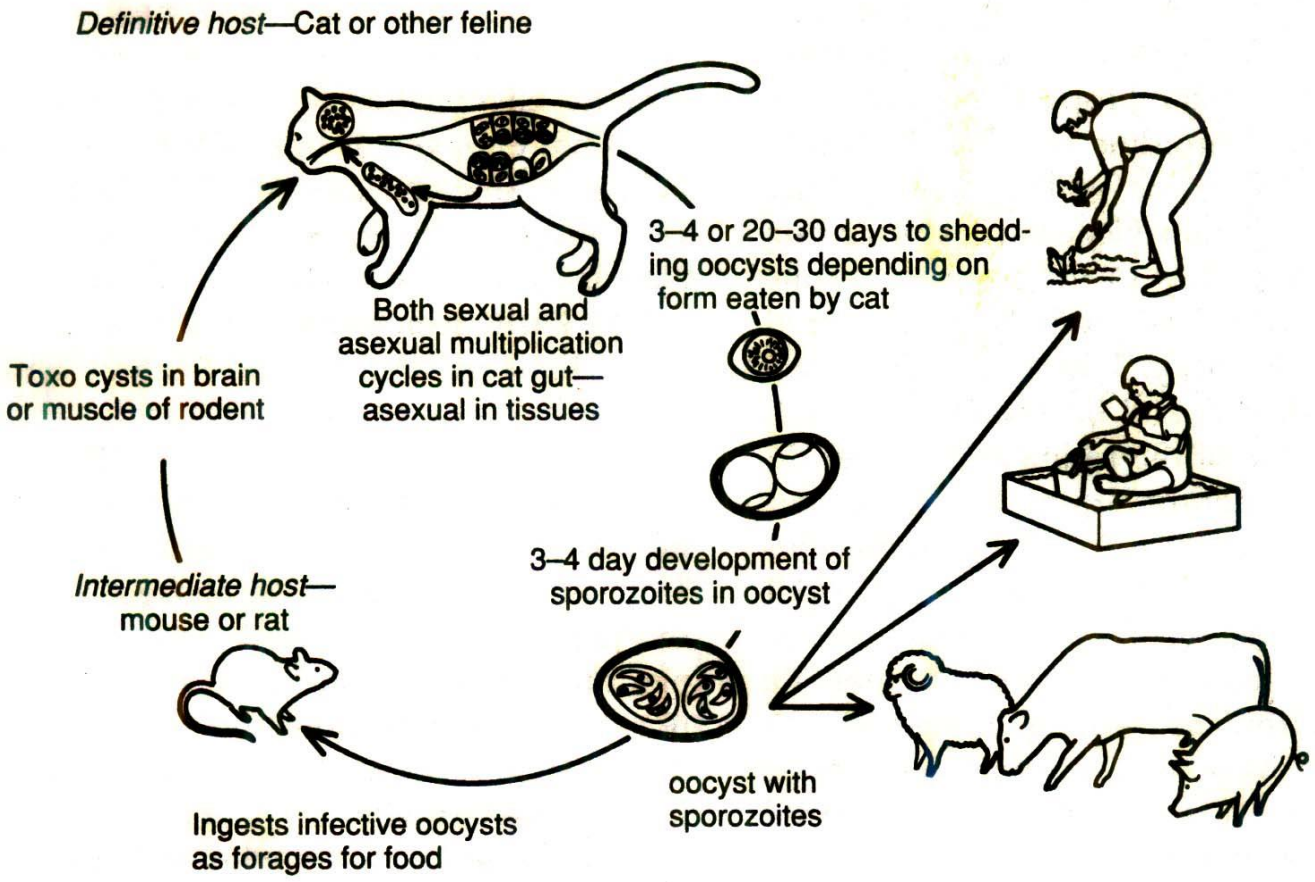
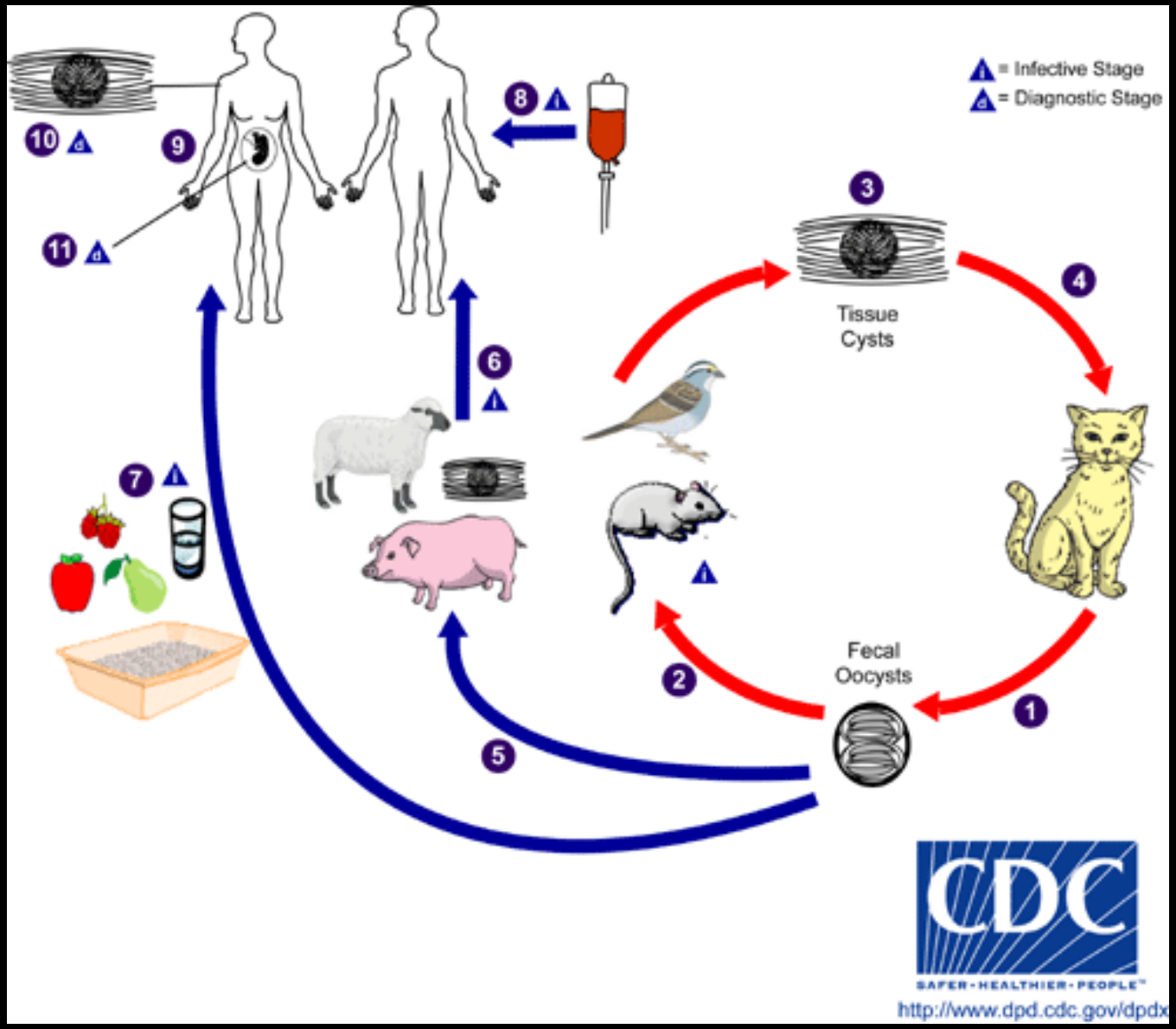


Figure 3–14. Transmission cycle of *Toxoplasma gondii*.

Toxoplasma life cycle



Transmission

Forms infective to man

- Sporozoites in oocysts → • Ingestion via soil contaminated with cat faeces
- Bradyzoites in tissue cysts → • Ingestion of raw meat • Organ transplant
- Tachyzoites in pseudocysts → • Trans placental • Blood transfusion; • Direct entry via cuts & abrasions (handling meat)

Clinical features

4 Patterns

- Acquired toxoplasmosis
- Disease in the immunocompromised
- Congenital infection
- Ocular toxoplasmosis

Clinical features

Acquired Toxoplasmosis

- Majority asymptomatic
- Lymphadenopathy +/ - fever
- Headache, sore throat, malaise
- Hepatosplenomegaly
- Maculopapular rash
- Changes in T lymphocyte levels
- Majority recover spontaneously
- Rarely complications such as pneumonitis, myocarditis, encephalitis etc

Clinical features

Disease in immunocompromised mostly reactivation of latent infections

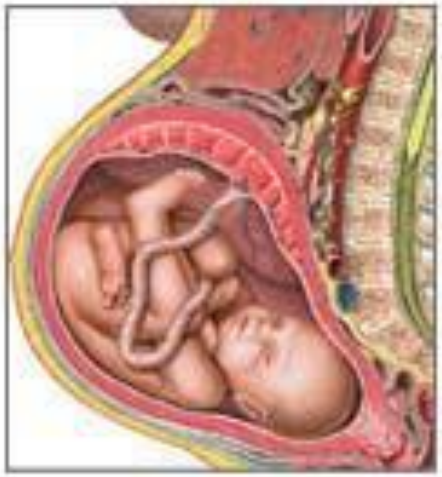
- Toxoplasma encephalitis/ brain abscess- head ache, focal neurologial signs, seizures, fatal if untreated
- Pneumonitis, myocarditis, disseminated disease
- Care takers of HIV –need to be alert as

Toxo. encephalitis

preventable

treatable

Congenital toxoplasmosis



A fetus may contract toxoplasmosis through the placental connection with its infected mother

The mother may be infected by:

Improper handling of cat litter

Handling or ingesting contaminated meat

Clinical features

- Congenital infection
- Mothers exposed for the 1st time during pregnancy
- 40% of babies infected
- 10% of babies – obvious disease at birth
- Proportion with subclinical infection develop disease later
- 1st trimester → Severe congenital inf N
  - → Abortion
  - → Sabin's tetrad

Clinical features congenital Toxo. cont…

Sabin's tetrad

- Microcephaly
- Chorioretinitis
- Convulsions
- Cerebral calcifications
- 2nd & 3rd trimesters disease less severe
- Often detected months- years later

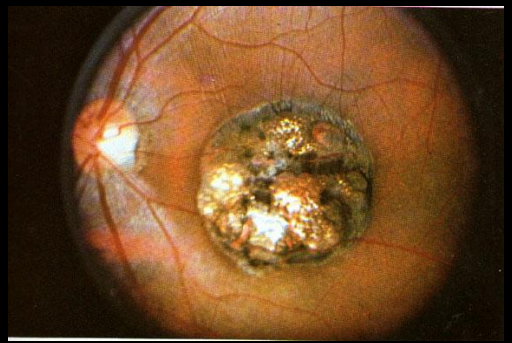
Hydrocephalus, convulsions, mental retardation, spasticity, chorioretinitis

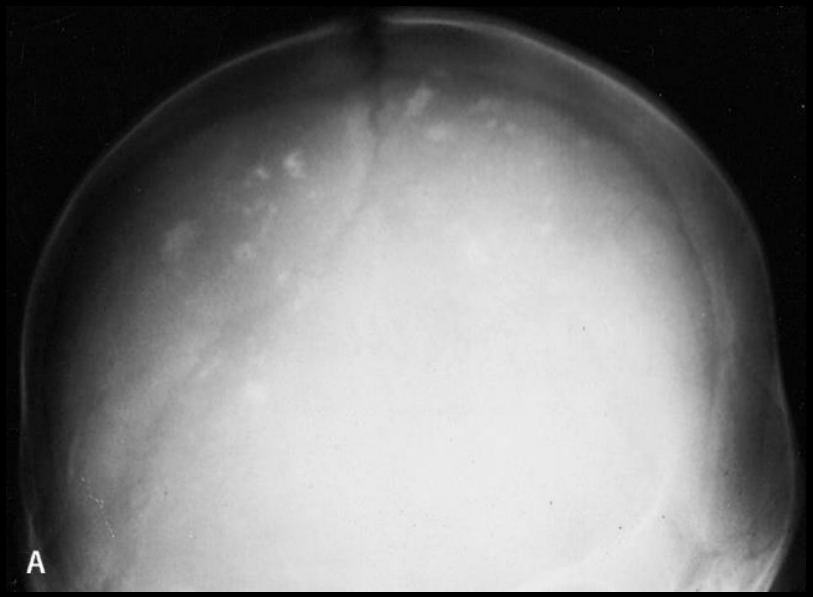
Top left; Hydrocephalus,

Top right; Internal hydrocephalus

Right; Cerebral calcification

Bottom; Chorioretinitis





Clinical features cont…..

Ocular Toxoplasmosis

- Usually a result of congenital Toxo.
- Affects the posterior segment of the eye (choroid & the retina)
- Lesion – acute focal chorioretinitis
- Opthalmoscopy – fluffy cotton wool patches in the fundus
- Presents – 2nd decade with blurring of vision & aching eyes

Ocular toxoplasmosis



- Toxoplasmosis and mental disorders

- Recent studies suggest chronic (latent) infections may play an etiological role in behavioral changes & mental disorders including schizophrenia and other psychiatric disorders
- Probably by affecting dopamine & other neurotransmitter activity in brain

Diagnosis

- History, examination, radiological evidence
- Lab diagnosis-

1) Serological tests

- Sabinfeldman dye test (reference test)
- IFAT- IgG & IgM antibodies
- ELISA- IgG & IgM Ab (used in Sri Lanka)
- IHAT
- Rapid diagnostics
- Toxoplasma encephalitis- CT scan multiple “ring enhancing” lesions

Diagnosis cont.…

2)Parasitological → Absolute proof

- Parasite isolation from tissues → H & E stained tissue sections

  Visualize tachyzoites

- Animal inoculation (mice) Examine mouse brain tissue 4-6 wks later for tissue cysts

3) Lymph node histology

4) Molecular methods Toxo. DNA

Treatment

- Indicated for
- Active disease

  Fever with widespread glandular / myocardial / brain Involvement
- All congenital & ocular infections
- Disease during pregnancy
- Disease in immunocompromised

- Drugs; Pyrimethamine +sulphadiazine
- Pregnancy; Spiramycin

Epidemiology

- Moderately common infection
- Prevalence varies with age, location, cat population & dietary habits
- AIDS has increased the incidence of Toxoplasma encephalitis
- Toxoplasma seroprevalence among young adult blood donors in SL- 20%

  antenatal mothers 12-20%
- France, Switzerland & in Germany seroprevalence rates- 50-70%
- USA 10-40%

Prevention

- Thorough cooking of meat
- Wash hands with soap & running water after handling raw meat / soil / cats
- Avoid handling meat with wounds / abrasions on hands
- Cats litter boxes to be emptied daily and disinfected with boiling water
- Children's sand boxes should be covered when not in use
- Chemoprophylaxis for immunocompromised

  Trimethoprim + Sulphamethoxazole

Summary

- Toxoplasmosis caused by *T. gondii*
- Transmission mainly by ingestion of oocyst (cat excreta) and tissue cyst (raw meat), trans-placental, transfusions & organ transplants
- 4 clinical disease patterns
- Opportunistic infection
- Diagnosed mainly by serology
- Treated with sulpha compounds