TOXOPLASMA GONDII

MEDICAL ACADEMY NAMED BY SI GEORGIEVISKIY
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DEPARTMENT OF MEDICAL BIOLOGY

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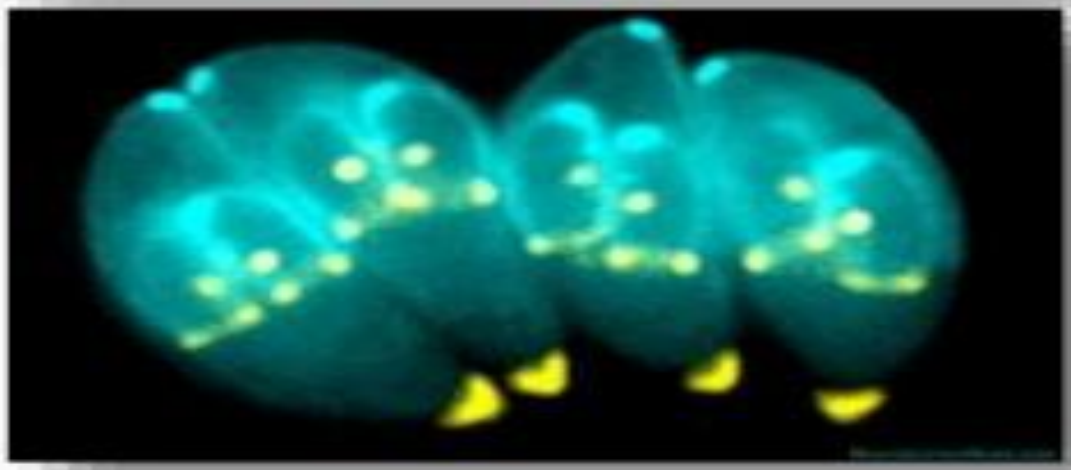
Outlines

- Taxonomy
- Prevalence
- Clinical importance
- Morphology
- Life cycle
- Prevention of infection
- Diagnosis
- Treatment

INTRODUCTION

- *Toxoplasma gondii* is a protozoan, obligate intracellular parasite
- Cause Toxoplasmosis
- Infects most species of warm-blooded animals, including humans.
- Members of the cat family Felidae- the only known definitive host for the sexual stages - *the* main reservoirs of infection.
- Alter the behavior in Rodents- Manipulation hypothesis (Decrease the aversion of rodents towards cat's urine)



TAXONOMIC CLASSIFICATION

D: Eukarya

K: Protista (Alveolata)

P: Apicomplexa

C: Coccidia

O: Eucoccidiorida

F: Sarcocystidae

G: *Toxoplasma*

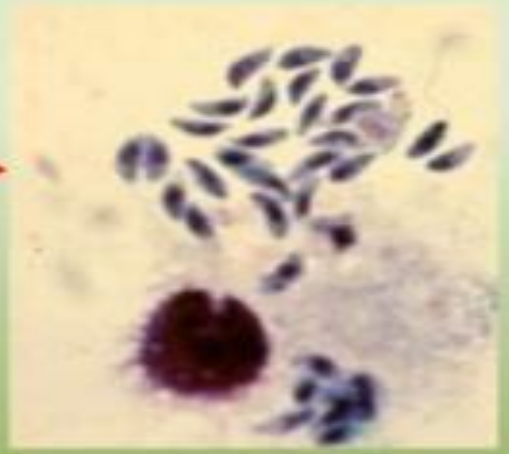
S: *gondii*

Toxoplasma gondii exists in four forms

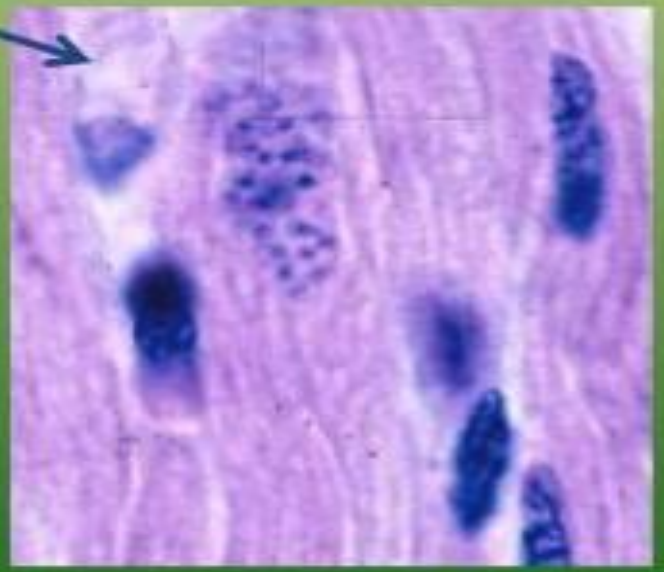
All parasite stages are infectious.

1. TACHYZOITES
2. TISSUE CYSTS
3. BRADYZOIT
4. OOCYSTS

Tachyzoites

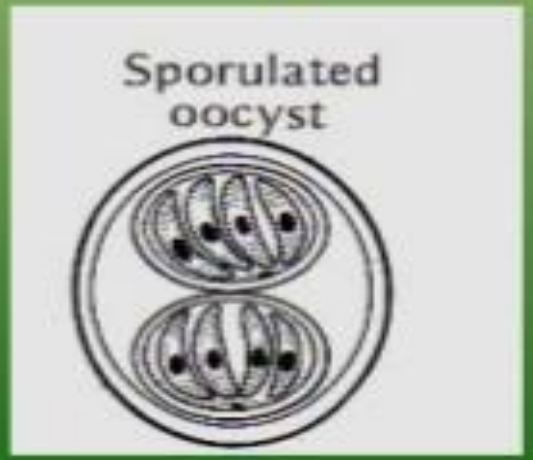


TISSUE CYSTS

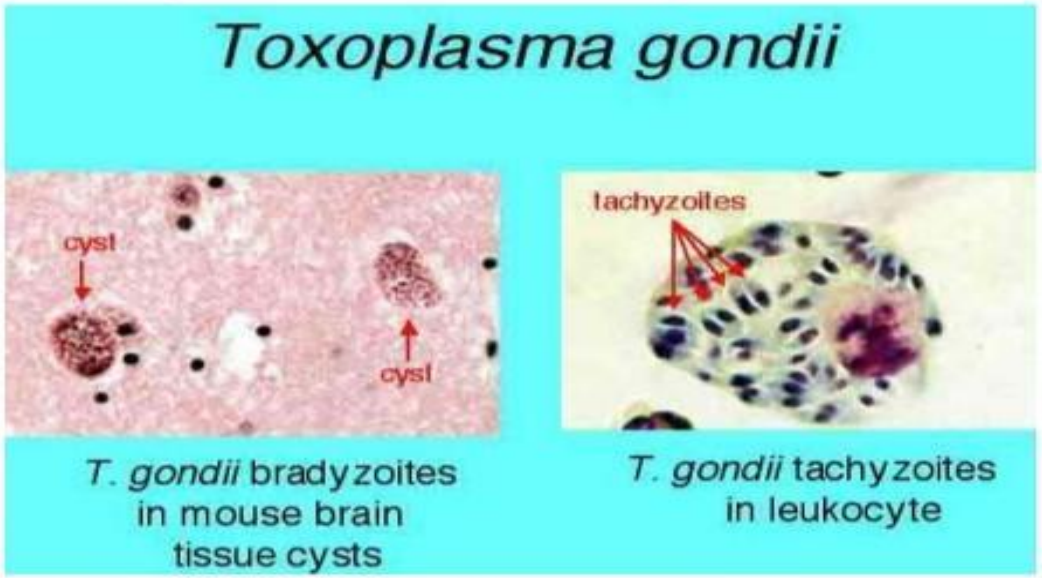


Bradyzoites

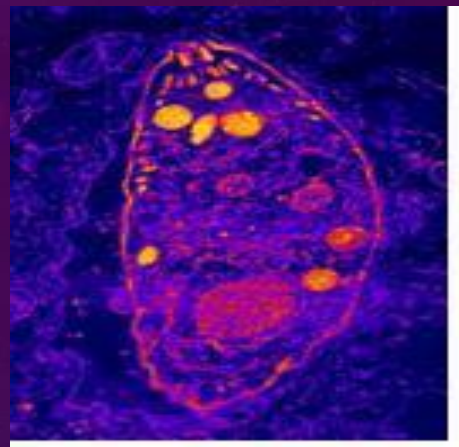
Oocysts

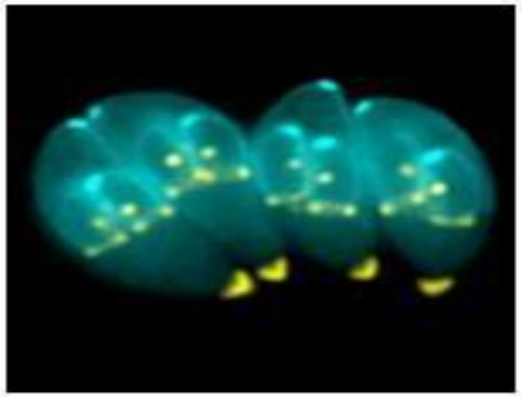


What is it?



- Zoonotic
- *Toxoplasma gondii* is a protozoan parasite
- It requires more than one host species to complete its lifecycle
- It is primarily an intestinal parasite in cats and has a wide host of intermediate hosts including sheep and mice
  - One cat shedding oocysts can provide enough contamination to infect an entire flock of sheep



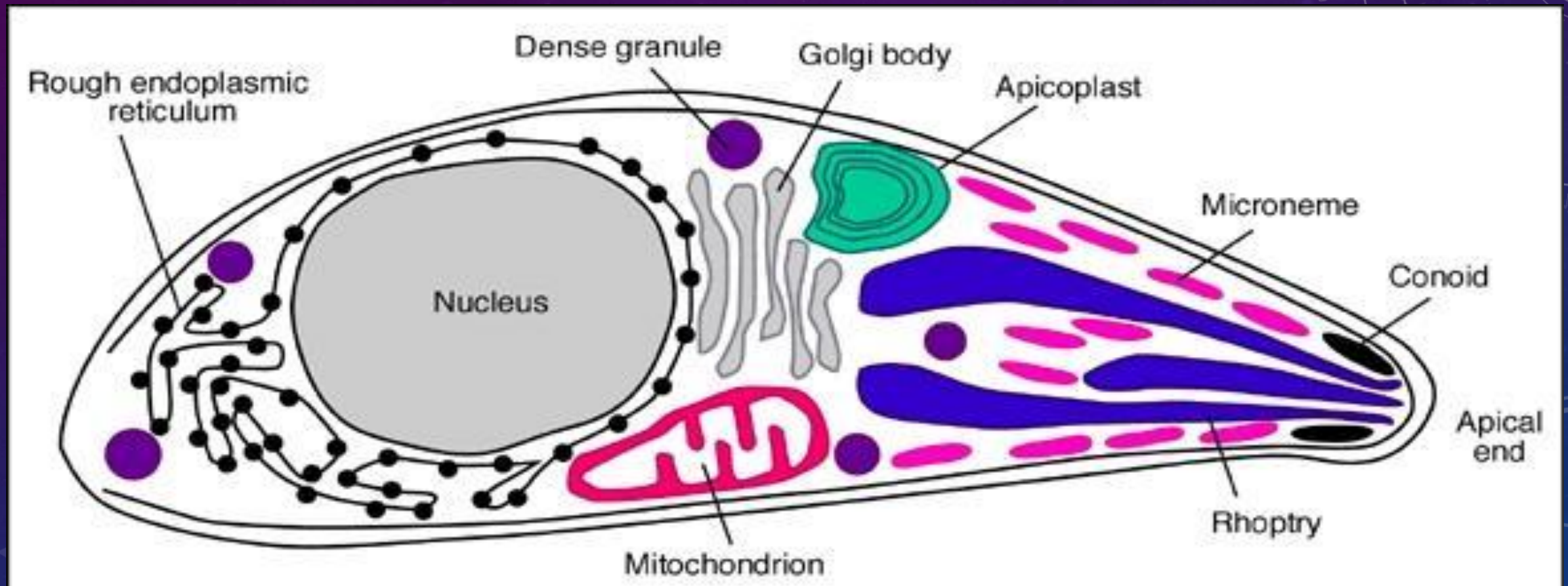


Toxoplasmosis

Is a protozoan shed in cats that can be spread to humans by a variety of ways.

Presented by: Navies 2011e

MORPHOLOGY

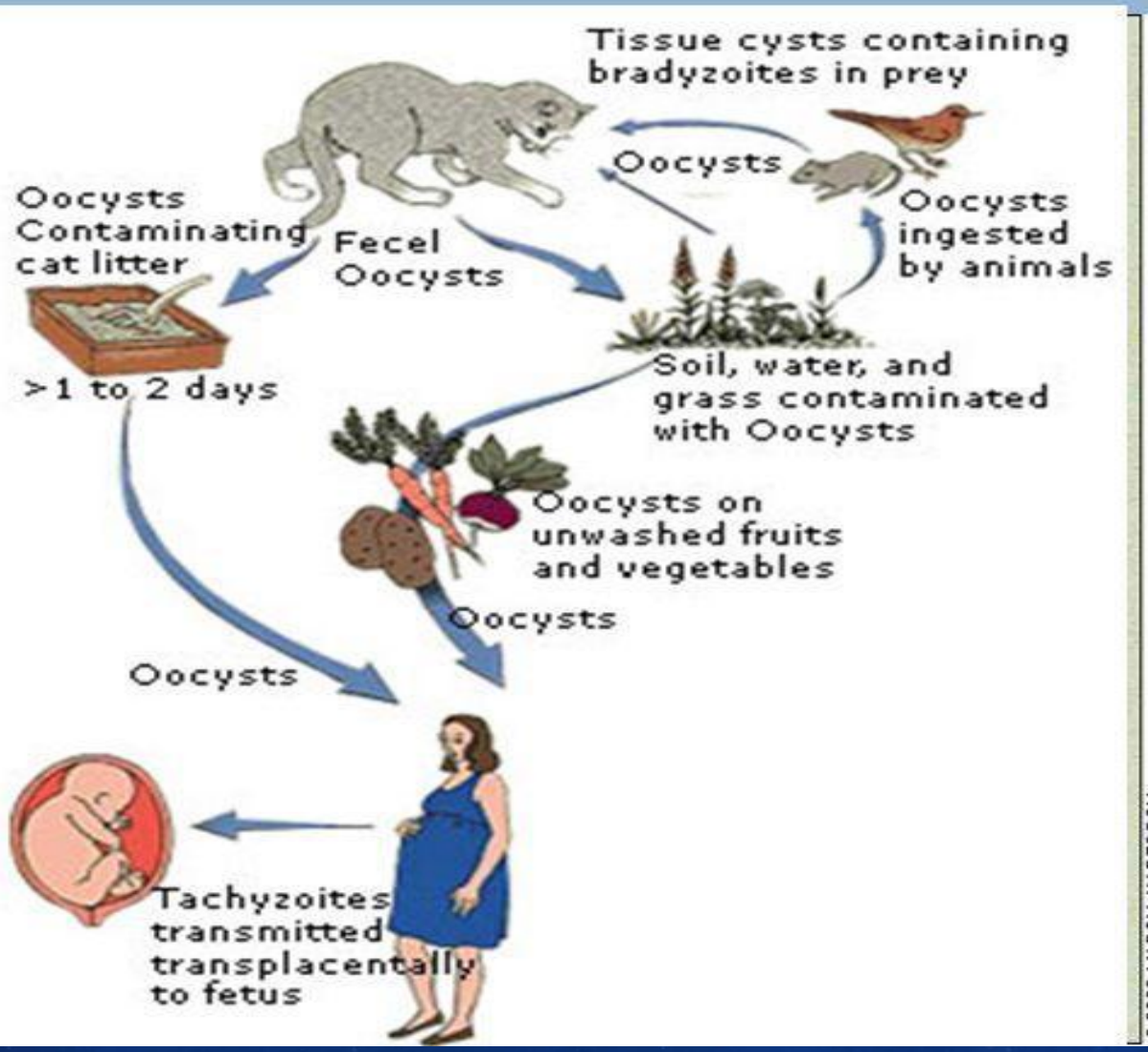


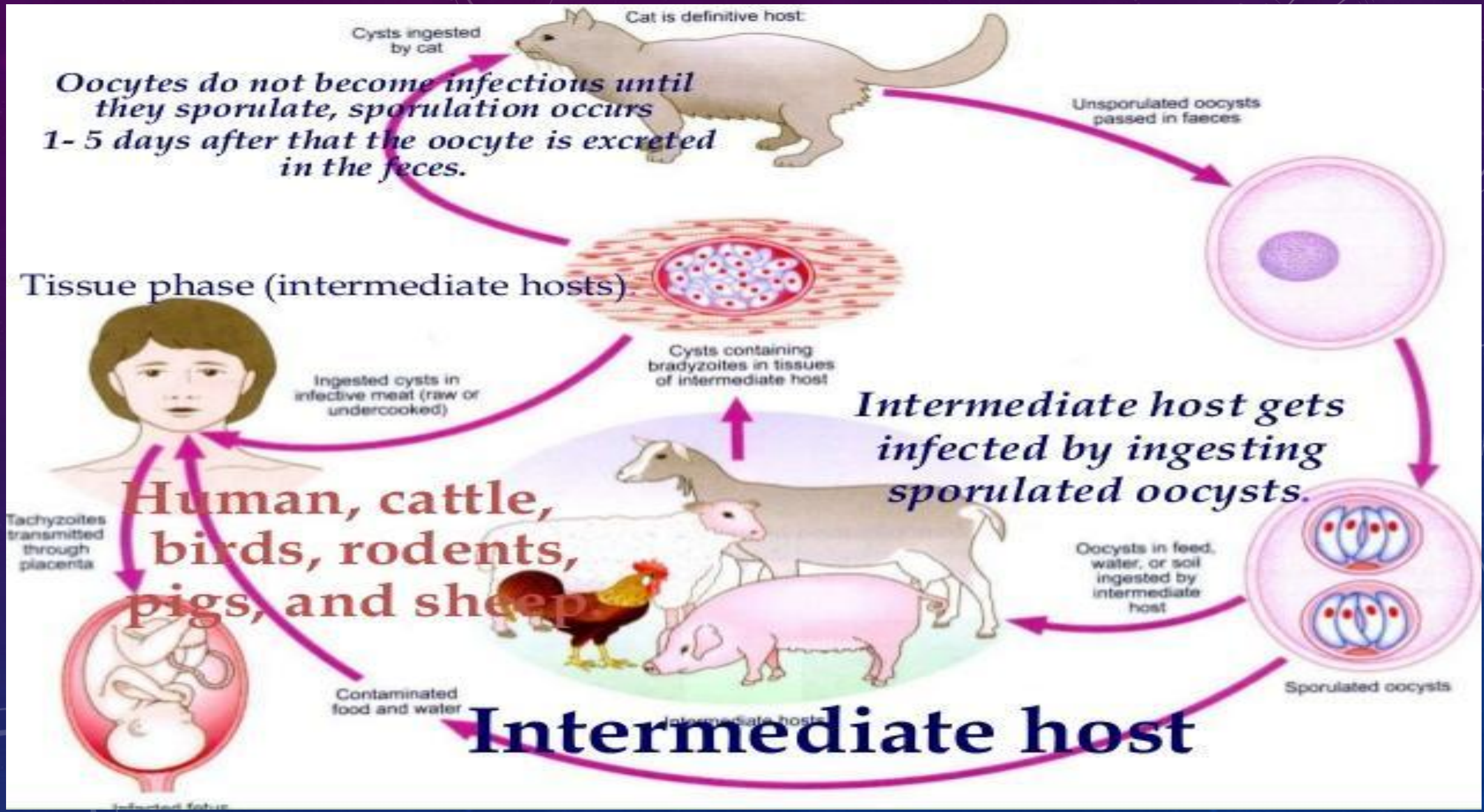
Ultrastructure of a *Toxoplasma gondii* tachyzoite

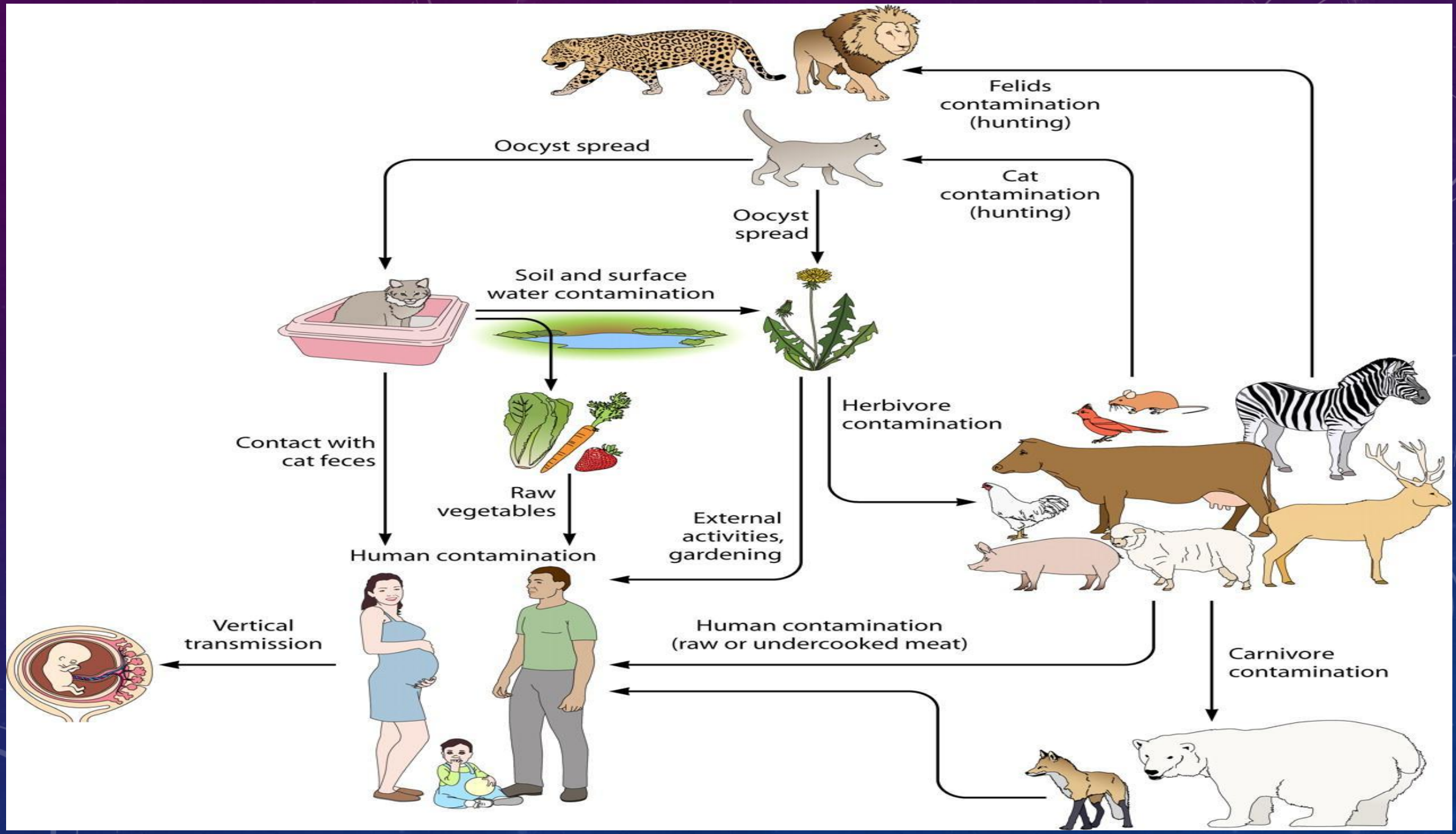
Ways of Infection

Oral intake of raw or rare ("under-cooked") **meat** or of contamination with **cats feces** or consumption of contaminated **vegetables**, **fruits**, and salad, …

- A fresh maternal infection during pregnancy can lead to an infection of the placenta.
- **Congenital Toxoplasmosis** results from transplacental infection of the fetus during pregnancy.

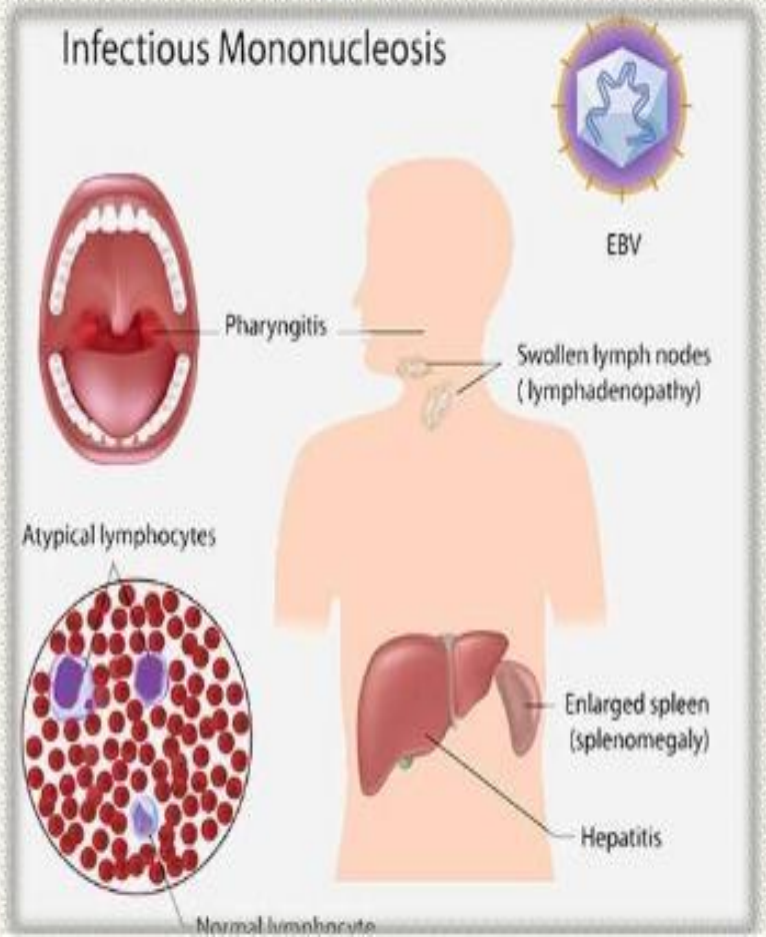



Cysts ingested by cat
Cat is definitive host
Oocytes do not become infectious until they sporulate, sporulation occurs 1- 5 days after that the oocyte is excreted in the feces.
Unsporulated oocysts passed in faeces
Tissue phase (intermediate hosts).
Cysts containing bradyzoites in tissues of intermediate host
Ingested cysts in infective meat (raw or undercooked)
Intermediate host gets infected by ingesting sporulated oocysts.
Human, cattle, birds, rodents, pigs, and sheep
Tachyzoites transmitted through placenta
Oocysts in feed, water, or soil ingested by intermediate host
Sporulated oocysts
Contaminated food and water
Intermediate host


Felids contamination (hunting)
Oocyst spread
Cat contamination (hunting)
Oocyst spread
Soil and surface water contamination
Contact with cat feces
Raw vegetables
Herbivore contamination
Human contamination
External activities, gardening
Vertical transmission
Human contamination (raw or undercooked meat)
Carnivore contamination

Clinical Importance

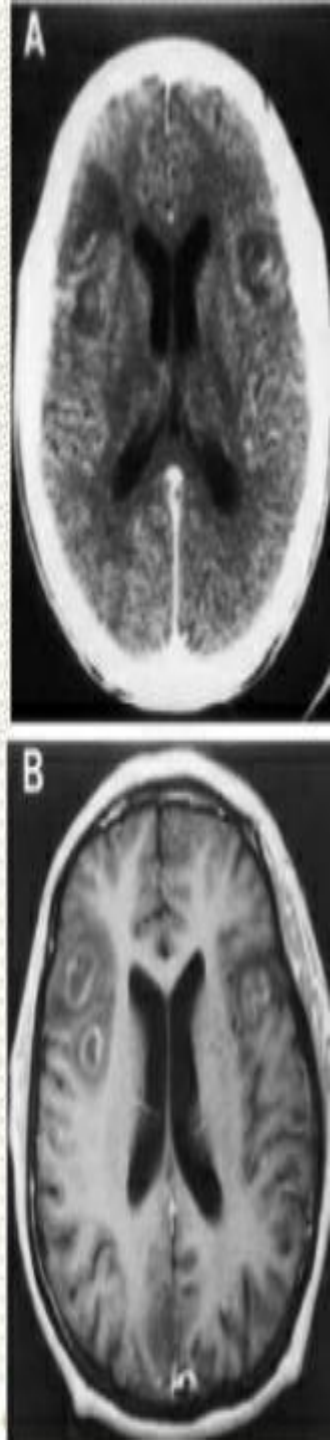
- **Acute disease in adults:**
- the majority are asymptomatic or unrecognized.



- **Immunocompromised Patients:**
- Most frequently results from reactivation of latent infection
- it can cause serious pathology including:

hepatitis, pneumonia, blindness, myocarditis

- the central nervous system is primarily involved with diffuse encephalopathy, meningoencephalitis or cerebral mass lesions. *Toxoplasma* encephalitis has been reported as a life-threatening among patients with AIDS.



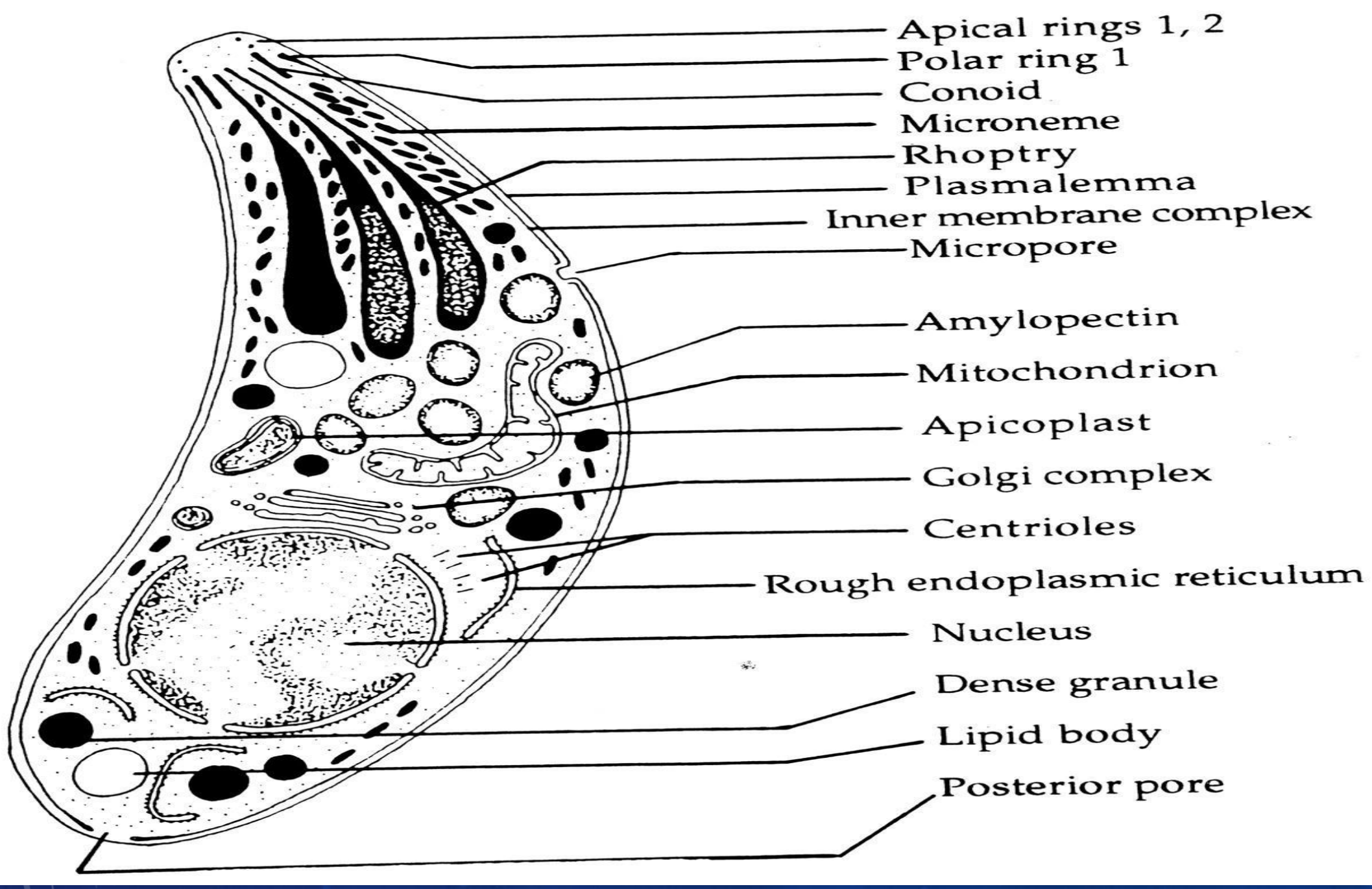
Toxoplasmic encephalitis in a 31 year-old man with AIDS. The multiple lesions demonstrated by CT scan

How It Develops

- It develops through three basic life forms
- Oocyst
  - Double layered egg found in the feces of young cats that survives for long periods
- Tachyzoite
  - Rapidly multiplying tiny parasite found in different cells of the body and the cells burst releasing it into the bloodstream
- Bradyzoite
  - Dormant stage found in cysts of the muscle, nervous tissue and placenta
- Unique stage is found in the feline family
  - The cat becomes infected from eating oocysts or an animal cyst containing bradyzoites. The parasite invades the intestines , mate and produce millions of offspring. The offspring are then excreted as immature oocysts in the feces

Who Is Susceptible?

- The most susceptible are ewe-lambs
- Early Pregnancy Ewes
  - Infection may result in embryonic death and resorption
- Mid-Pregnancy Ewes
  - Infection can result in fetal death followed by mummification, fetal infection, or fetal retardation resultant from compromised placenta nutrition
- Late Pregnancy Ewes
  - Infection may result in still-born lambs or weak lambs and high lamb mortality rates


Apical rings 1, 2
Polar ring 1
Conoid
Microneme
Rhoptry
Plasmalemma
Inner membrane complex
Micropore
Amylopectin
Mitochondrion
Apicoplast
Golgi complex
Centrioles
Rough endoplasmic reticulum
Nucleus
Dense granule
Lipid body
Posterior pore

The Cycle

- It attacks the organs of the body
- Sporozites from oocysts or bradyzoites penetrate the cells of the intestine
- They then multiple until the cell bursts release toxins into the bloodstream
  - This occurs in 5 days
- The parasite (trachyzoite) then circulates in the blood for 2-3 weeks invading tissues throughout the body (including the placenta)
- The development of immunity stops the circulation of the parasite in the blood
- The parasite evades elimination by transforming into a tissue cyst
- Lambs do not have the ability to fight disease until they are 60 days old, therefore causing fetal death if exposed to parasite

4-5/8

Prevention

- **REMEMBER TOXOPLASMOSIS IS TRANSMISSIBLE TO HUMANS!!**
- Limit cat breeding and maintain a healthy adult cat population
- Oocysts can be destroyed by boiling water
  - Temperature 90 C for 30 minutes
- Ammonium hydroxide is effective in ten minutes
- Oocysts are resistant to sodium hypochlorite (bleach) and sodium hydroxide
- Properly dispose of infected dead lambs and membranes
- Remove flock from areas where cats have had litters of kittens
- Drugs Decoquinate (Deccox) and Monesin sodium (Rumensin) given with supplementary feeding aids can help control the infection
- The UK and the Europe have a vaccination Toxo-Vax but it has not been licensed for use in the US

Transmission/Symptoms

- Transmission
  - Sheep are infected by eating oocysts in hay, pasture and other feed stuffs or contaminated water
  - As few as 40 oocysts are required to infect a ewe
  - Oocysts can also be spread by wind
  - Oocysts can survive for at least a year in an environment, tachyzoites cannot survive outside the host
  - Rams CANNOT transmit this disease while mating and direct sheep to sheep spread at lambing has not been proven
- Symptoms
  - Most infected animals do not show any symptoms
  - Main symptom is abortion, neonatal death or lamb retardation
  - May have a fever during the parasite in the blood phase or mild diarrhea
  - The placental membranes of affected lambs may show lesions
  - The disease can also affect twins or triplets differently

REFRENCES

- https://www.cdc.gov/parasites/toxoplasmosis/gen_info/faqs.html

- https://www.ccohs.ca/oshanswers/diseases/toxoplasmosis.html


Thank you