



TOXOPLASMA GONDII

MEDICAL ACADEMY NAMED BY SI GEORGIEVSKIY

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DEPARTMENT OF MEDICAL BIOLOGY

• 1st course

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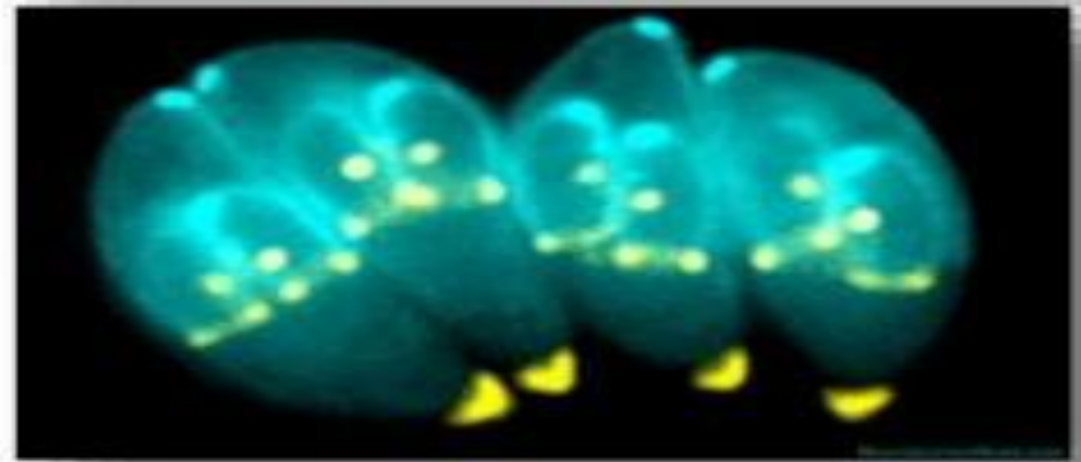
Outlines

- 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.

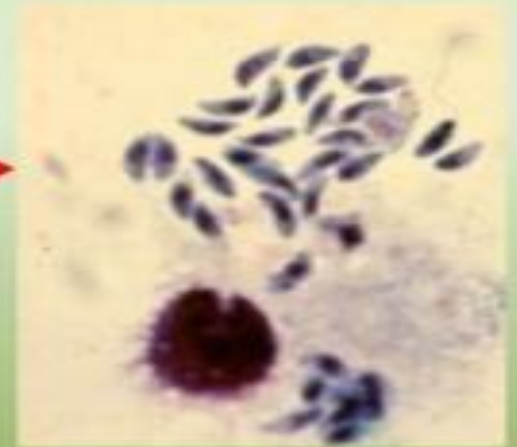
1. TACHYZOITES

2. TISSUE CYSTS

3. BRADYZOIT

4. OOCYSTS

Tachyzoites

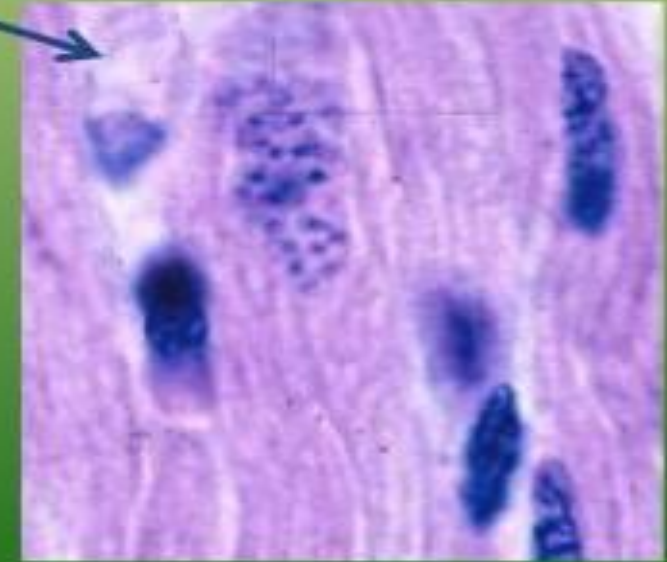


Bradyzoites

TISSUE CYSTS

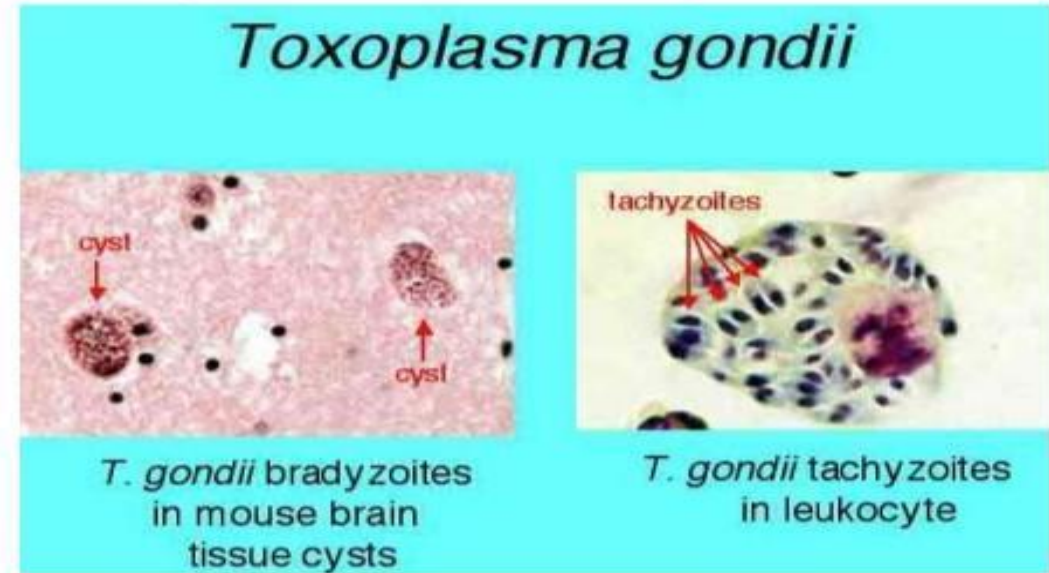
Oocysts

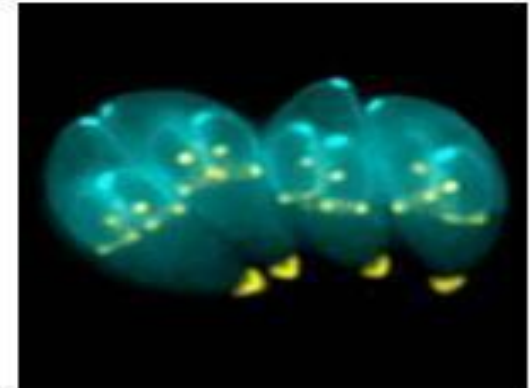
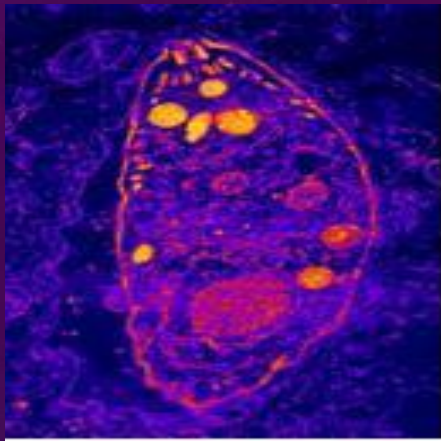
Sporulated oocyst



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





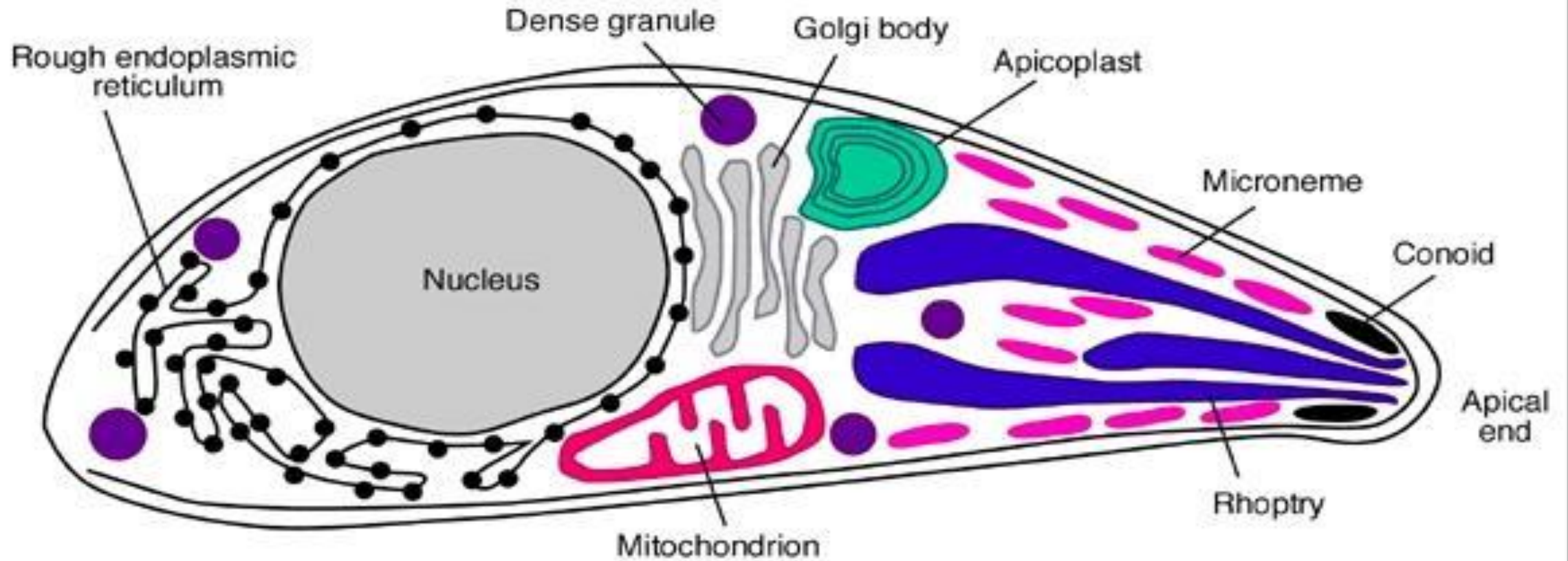
Toxoplasmosis

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

Presented by: Navies 2011e



MORPHOLOGY



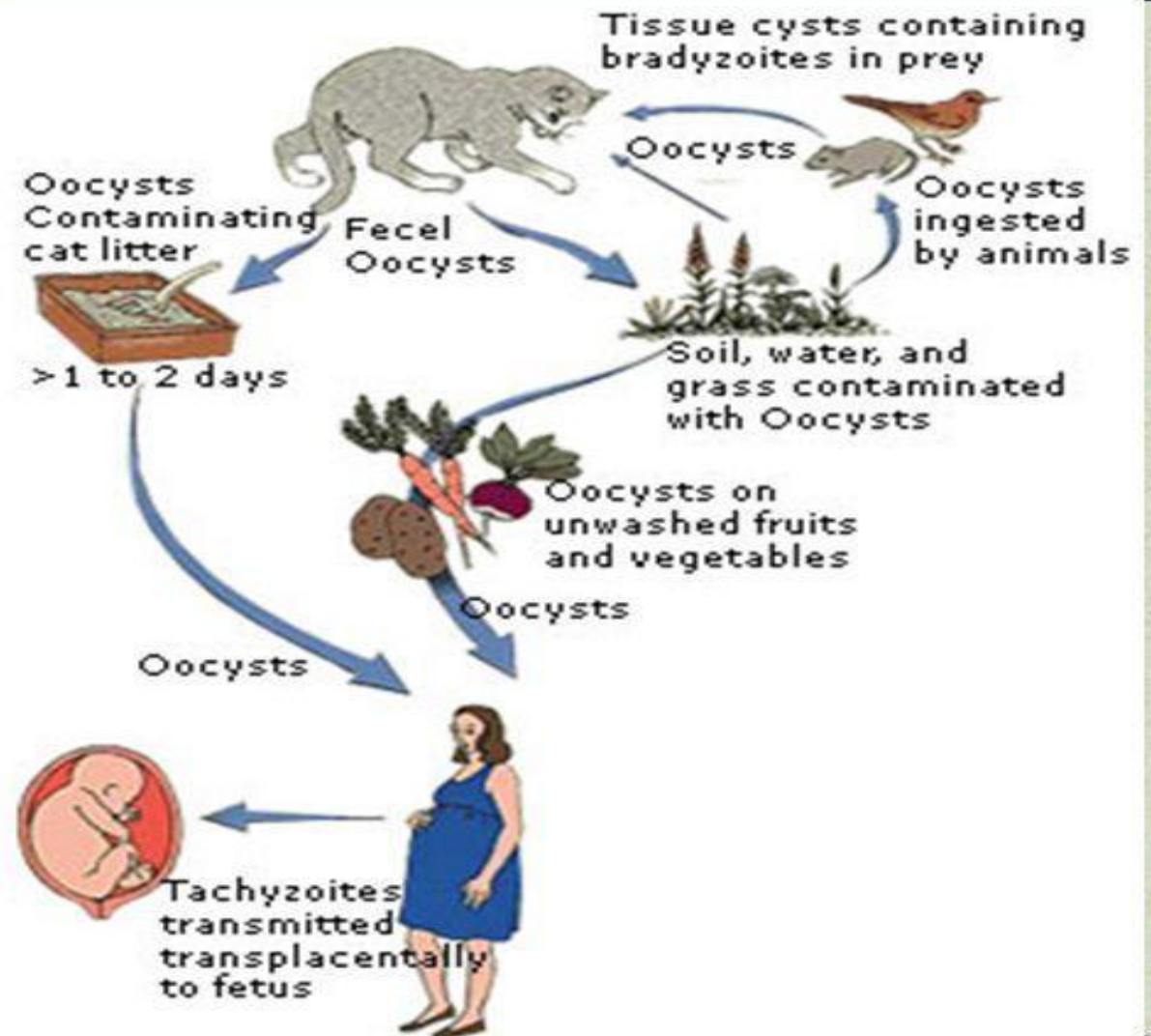
Ultrastructure of a *Toxoplasma gondii* tachyzoite

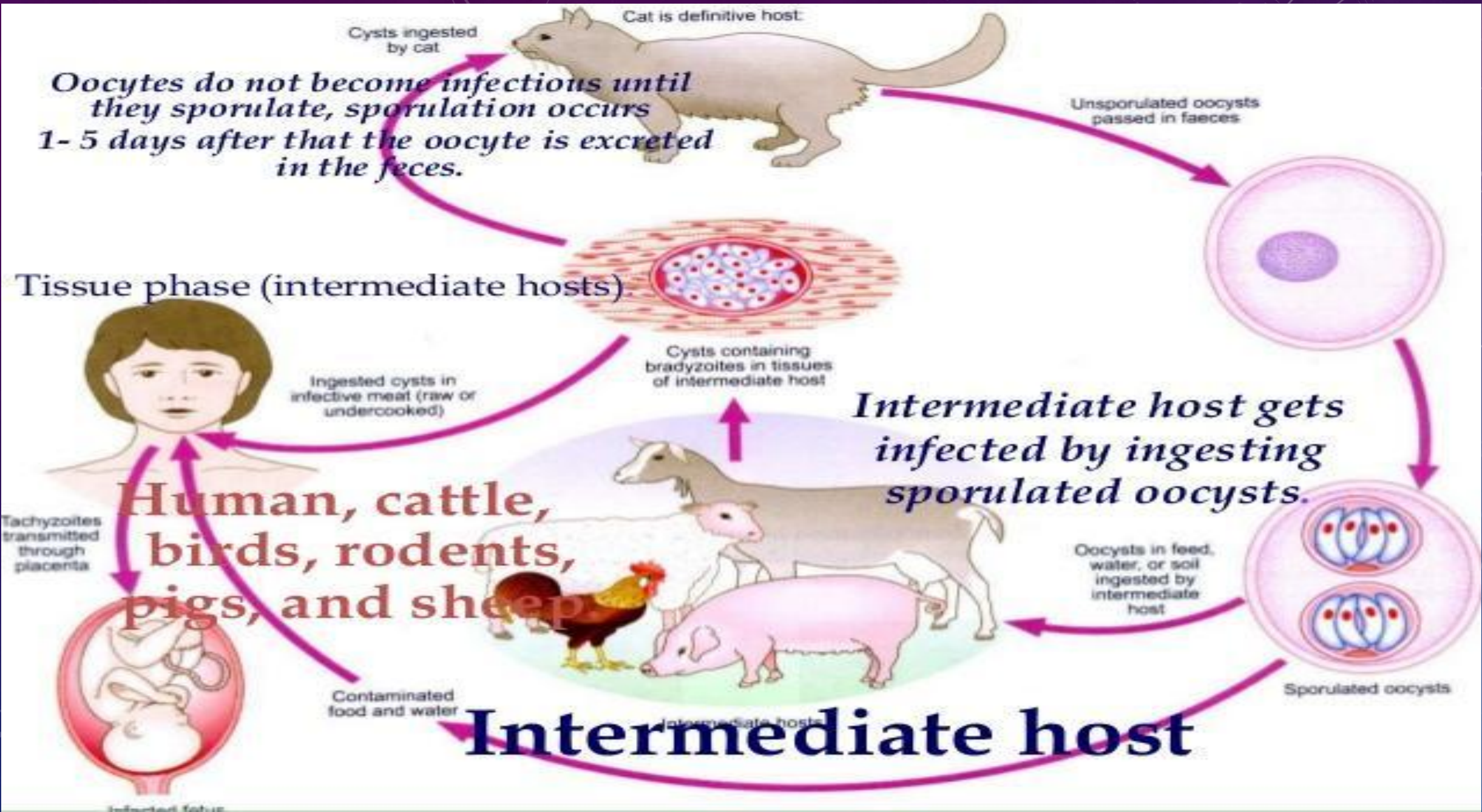
Expert Reviews in Molecular Medicine ©2001 Cambridge University Press

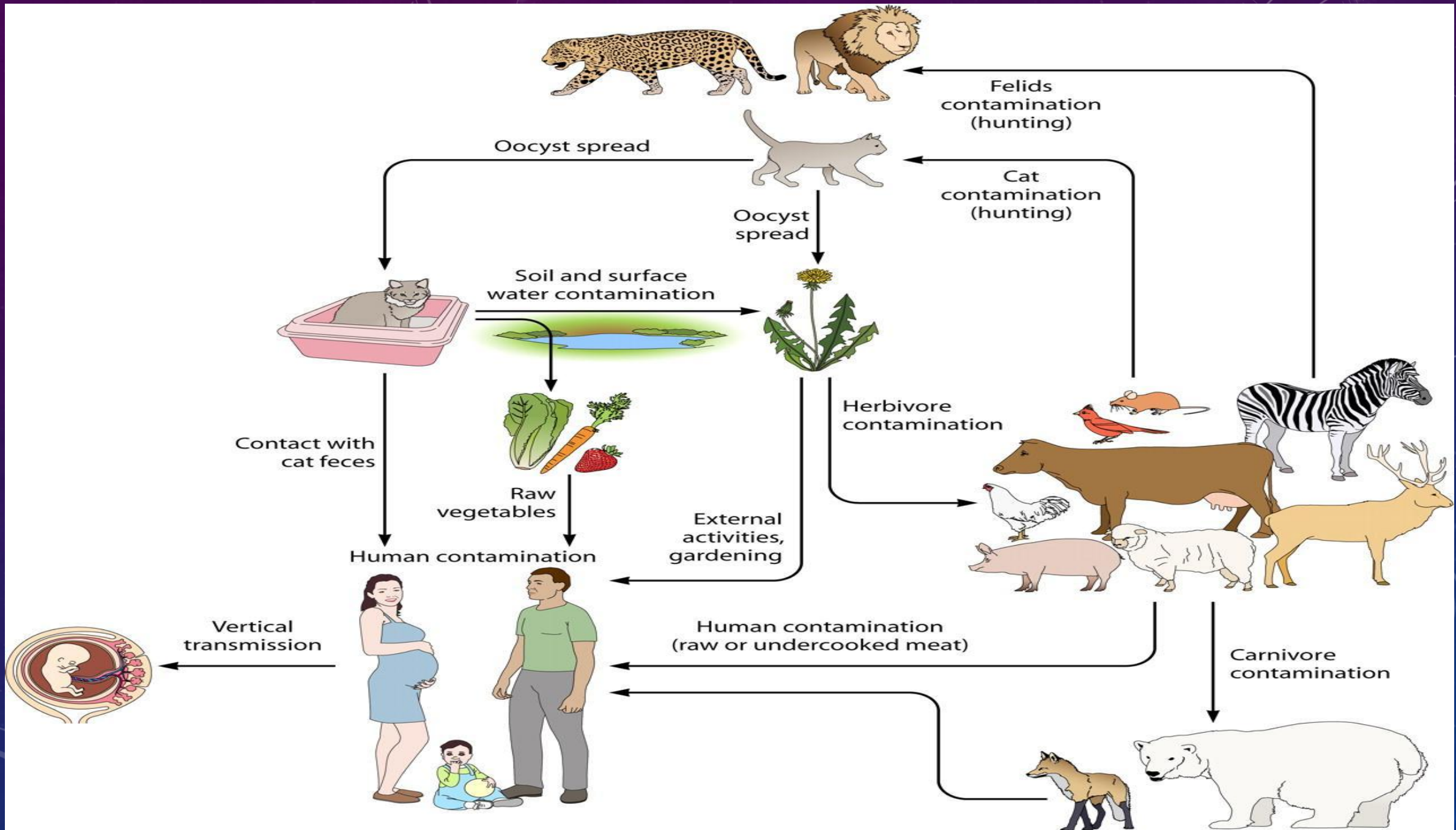
Ways of Infection

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.







Clinical Importance



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

Infectious Mononucleosis



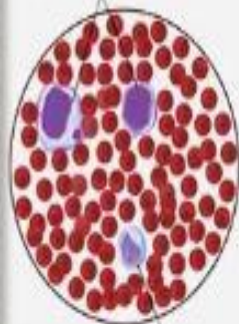
EBV



Pharyngitis

Swollen lymph nodes
(lymphadenopathy)

Atypical lymphocytes



Normal lymphocyte

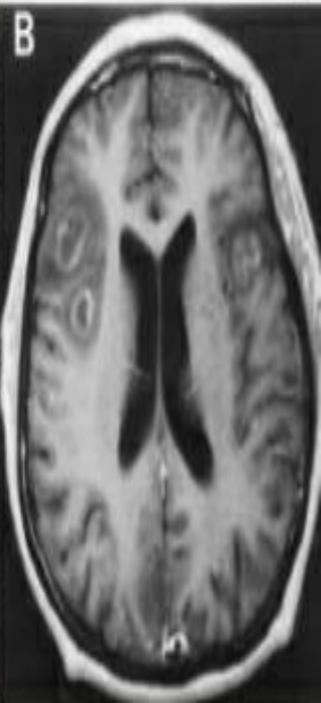
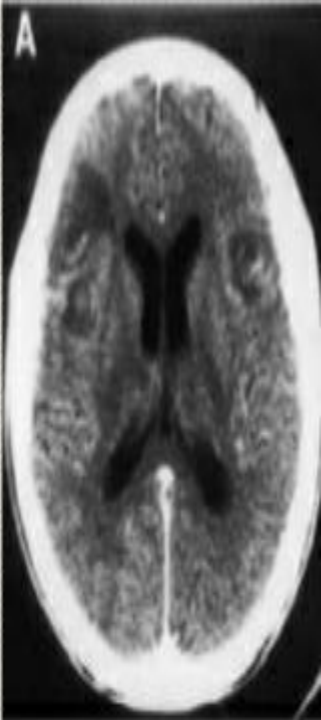


Enlarged spleen
(splenomegaly)

Hepatitis



- **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.



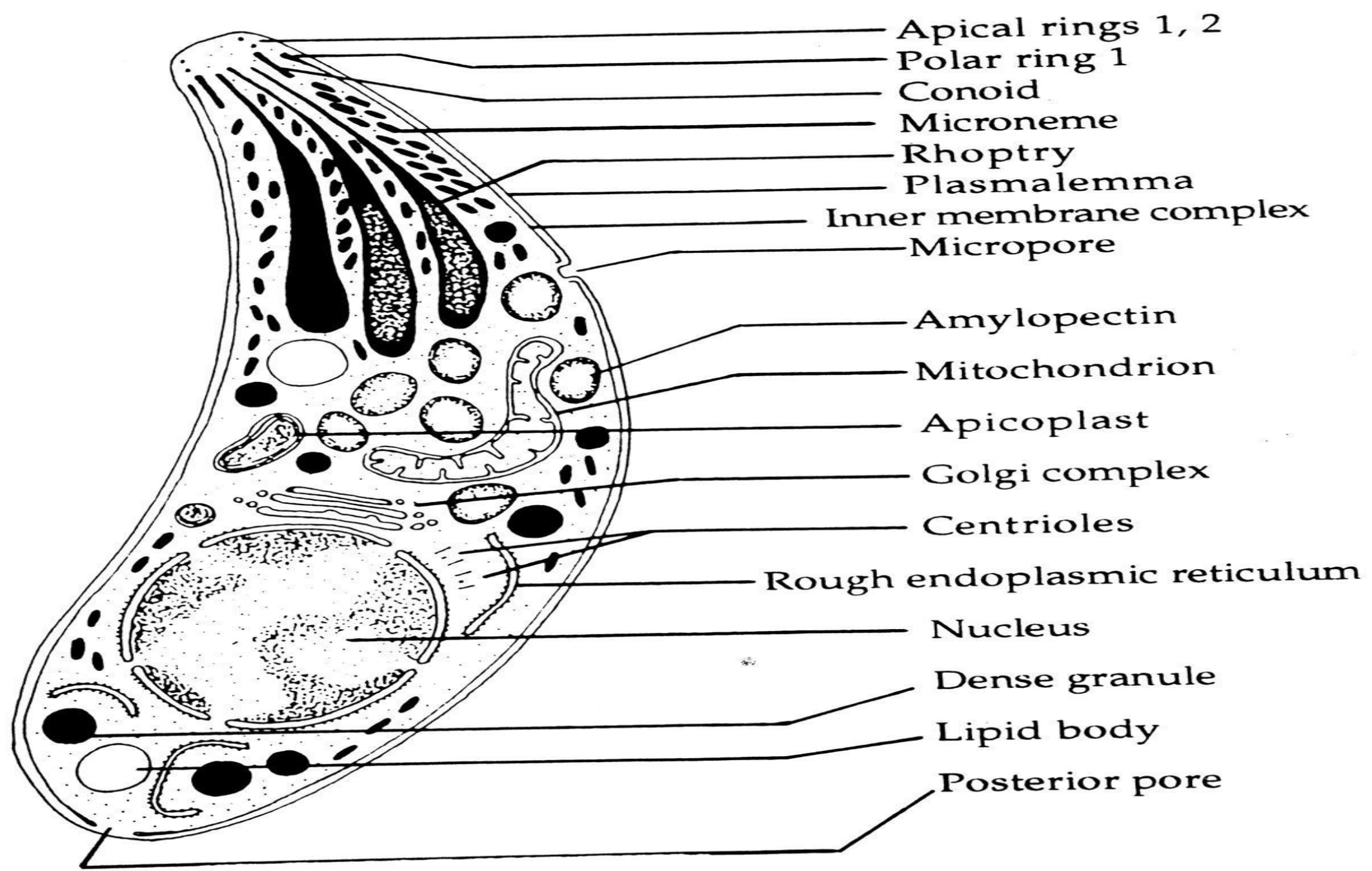
Toxoplasmic encephalitis in a 31 year-old man with AIDS. The multiple lesions demonstrated by CT scan

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



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 releasing 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

REFERENCES

- https://www.cdc.gov/parasites/toxoplasmosis/gen_info/faq.html
- <https://www.ccohs.ca/oshanswers/diseases/toxoplasmosis.html>

Thank
you