Protozoa

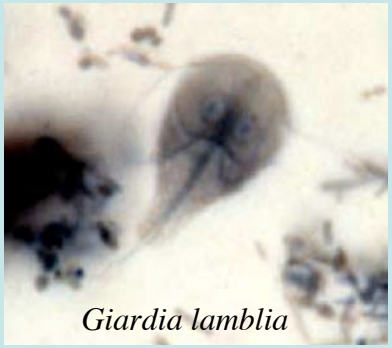
1. All are single-celled organisms

2. All are eukaryotes

3. Locomotion:

Balantidium coli

Ciliae



Giardia lamblia

Flagellae

Entamoeba histolytica

Pseudopods

4. Most protozoa are free-living

Protozoan Parasites

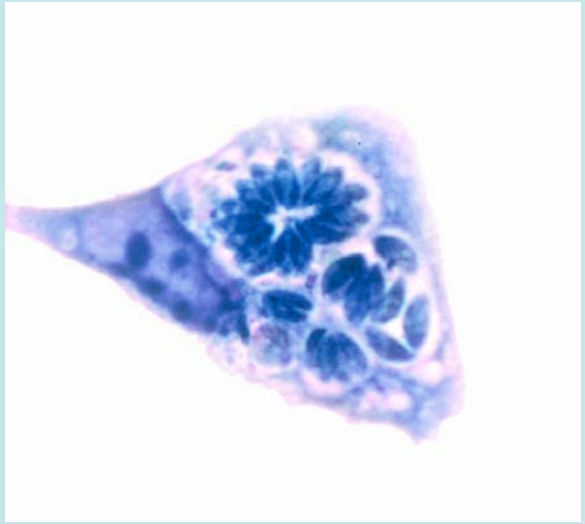
1. *Toxoplasma gondii*

2. The Malarias
   - *Plasmodium falciparum*
   - *Plasmodium vivax*
   - *Plasmodium ovale*
   - *Plasmodium malariae*

3. Diarrheal disease-causing protozoa:
   - *Giardia lamblia*
   - *Entameba histolytica*
   - *Cryptosporidium parvum*
   - *Cyclospora cayetanensis*

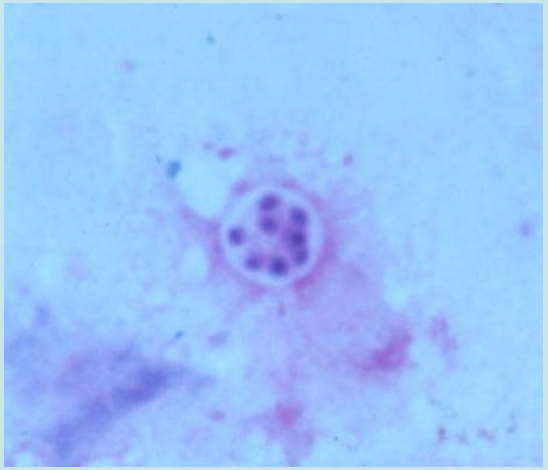
Protozoa:

Toxoplasma gondii



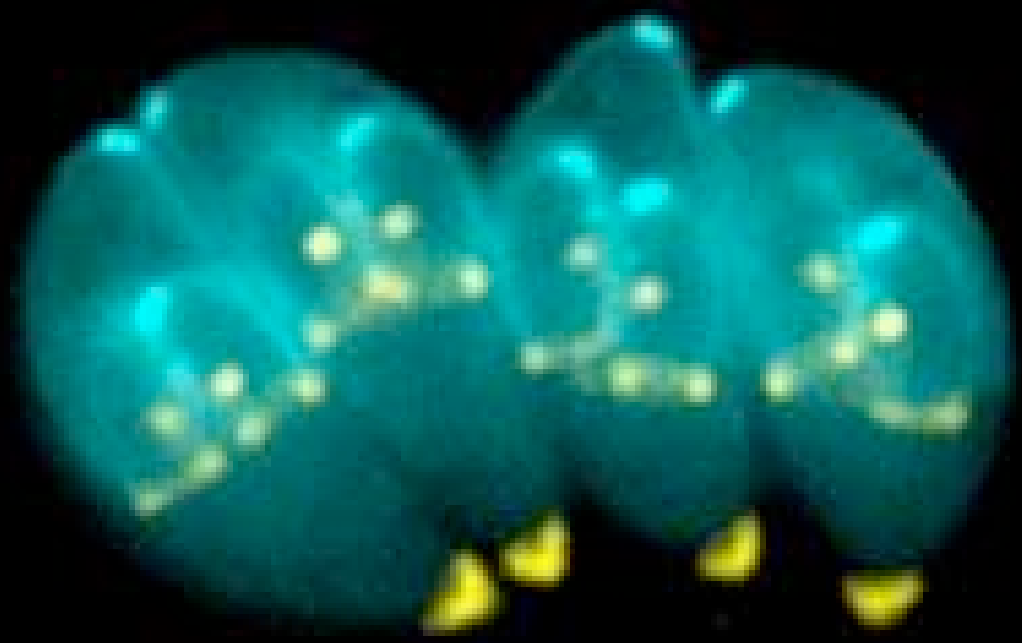
and

*Pneumocystis jiroveci**

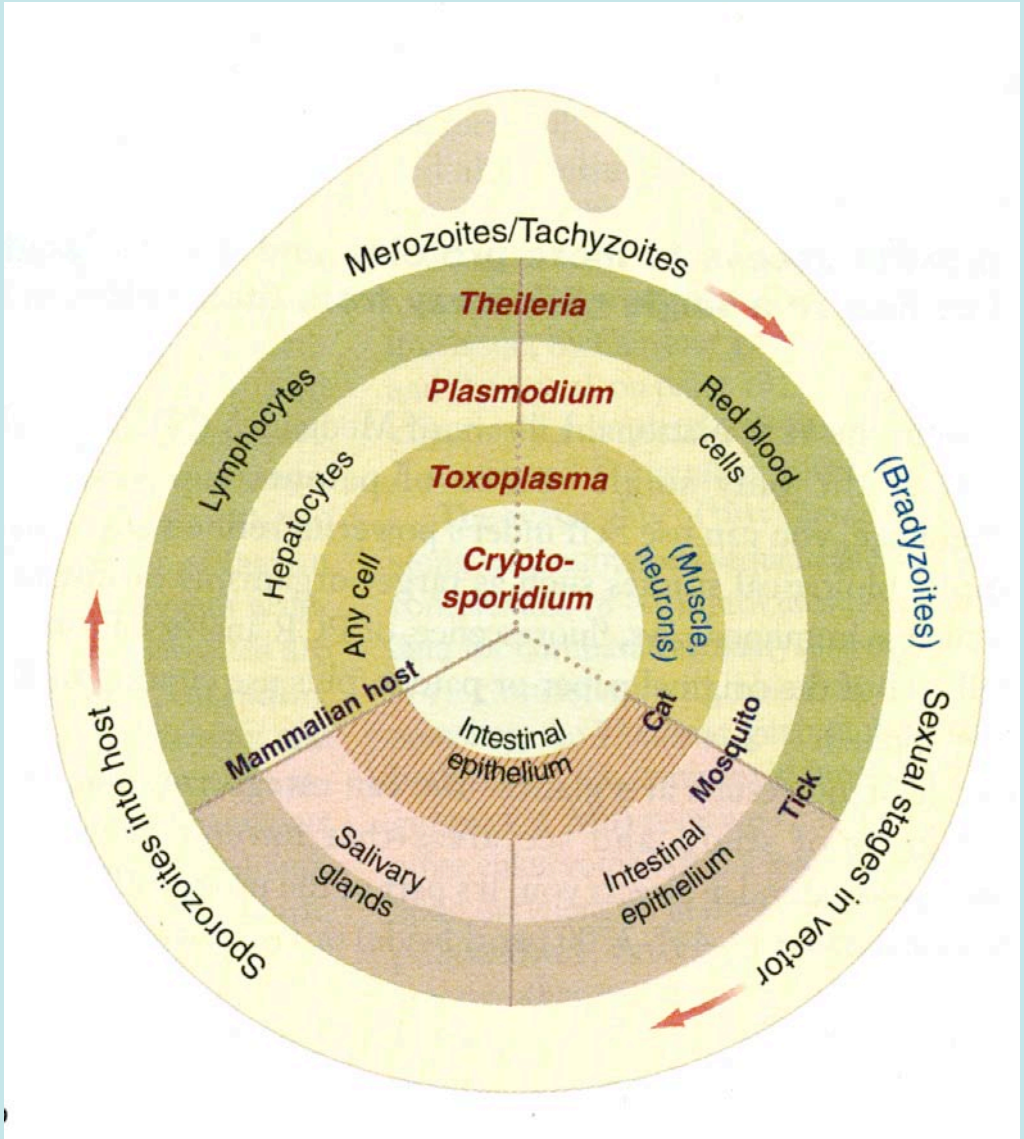


*actually an unusual fungus

Toxoplasma gondii

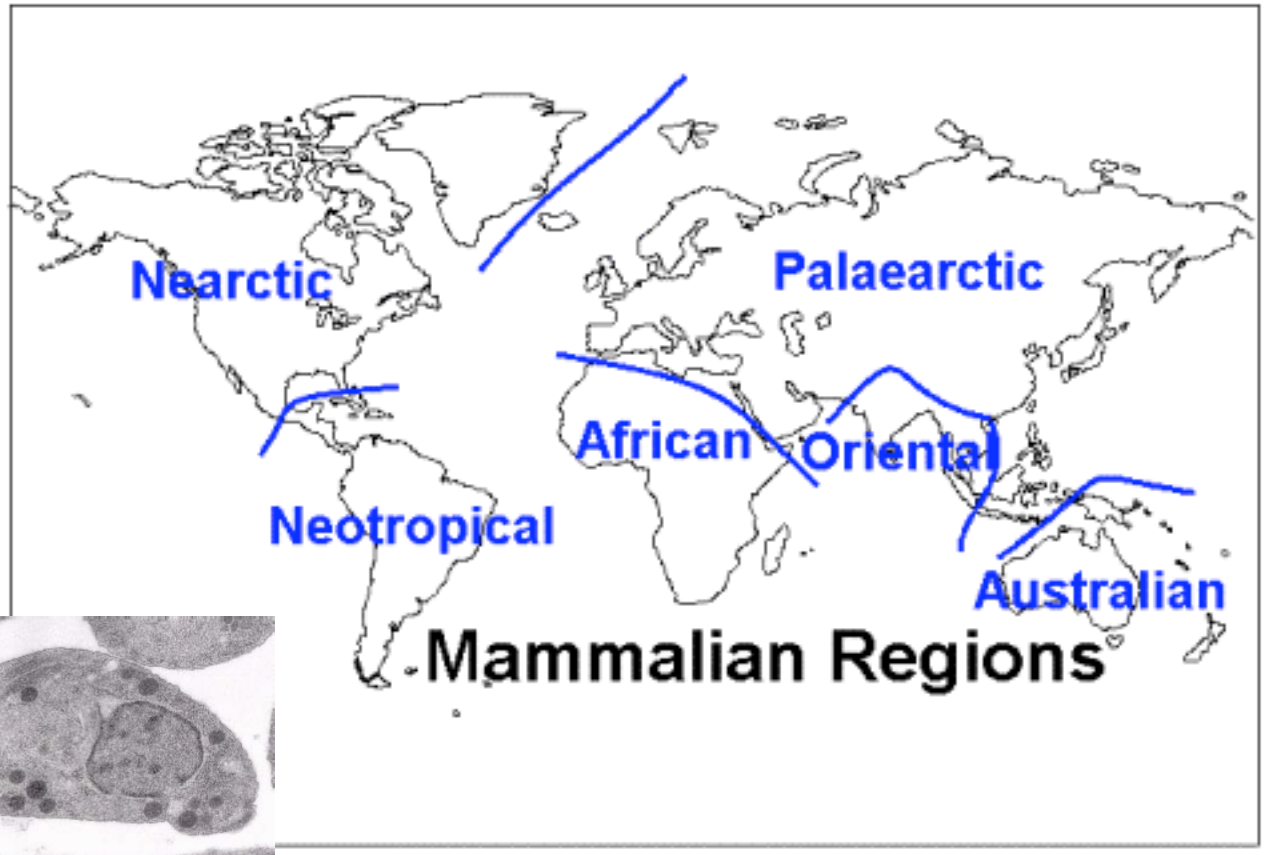


The Apicomplexa



Toxoplasma gondii
The Plasmodia (malaria)
Cryptosporidium parvum

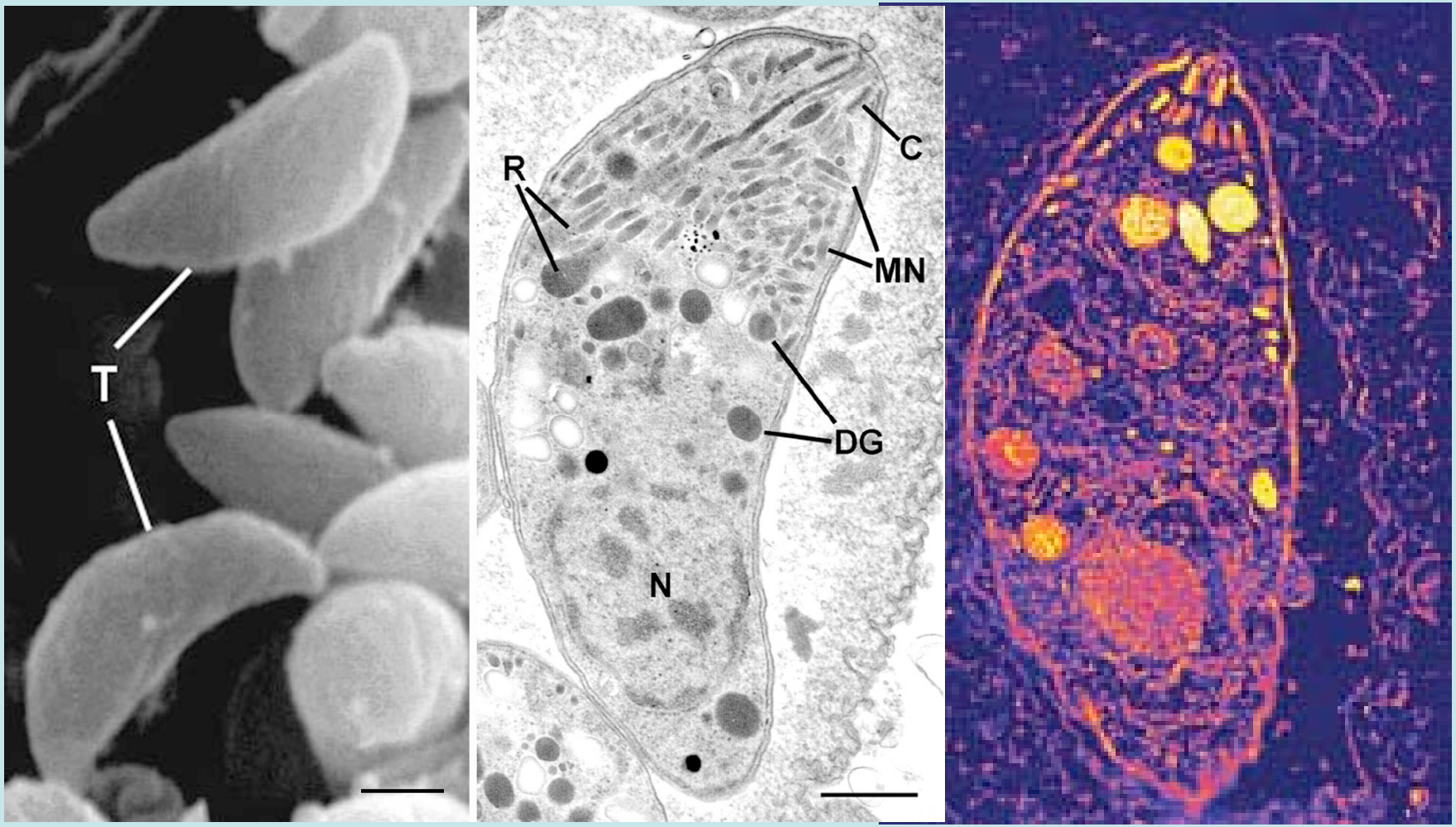
Toxoplasma gondii infects all mammals
and all tissues in each of them.




STEAK
LOVER'S
COOKBOOK
Carnivores
12/25/2000
Martes communis.

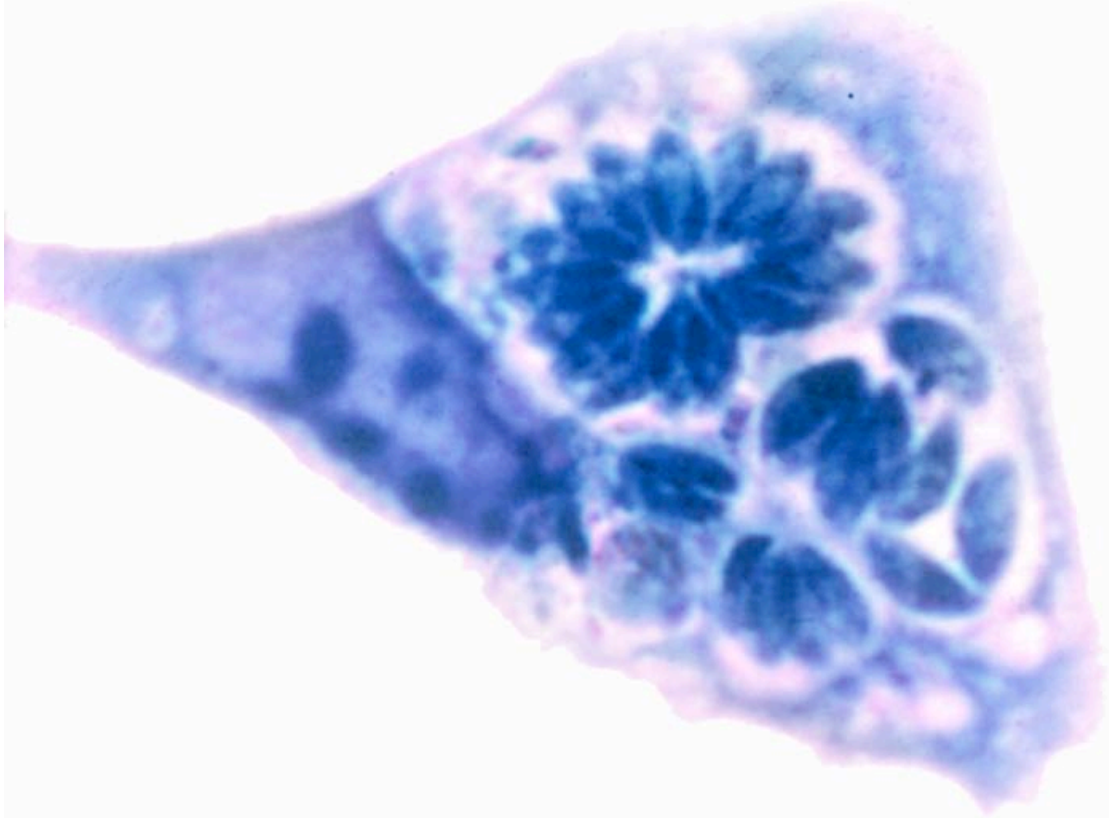
The Sea Otter is at great risk from dying from acquired toxoplasmosis

Tachyzoite stage of *Toxoplasma gondii*



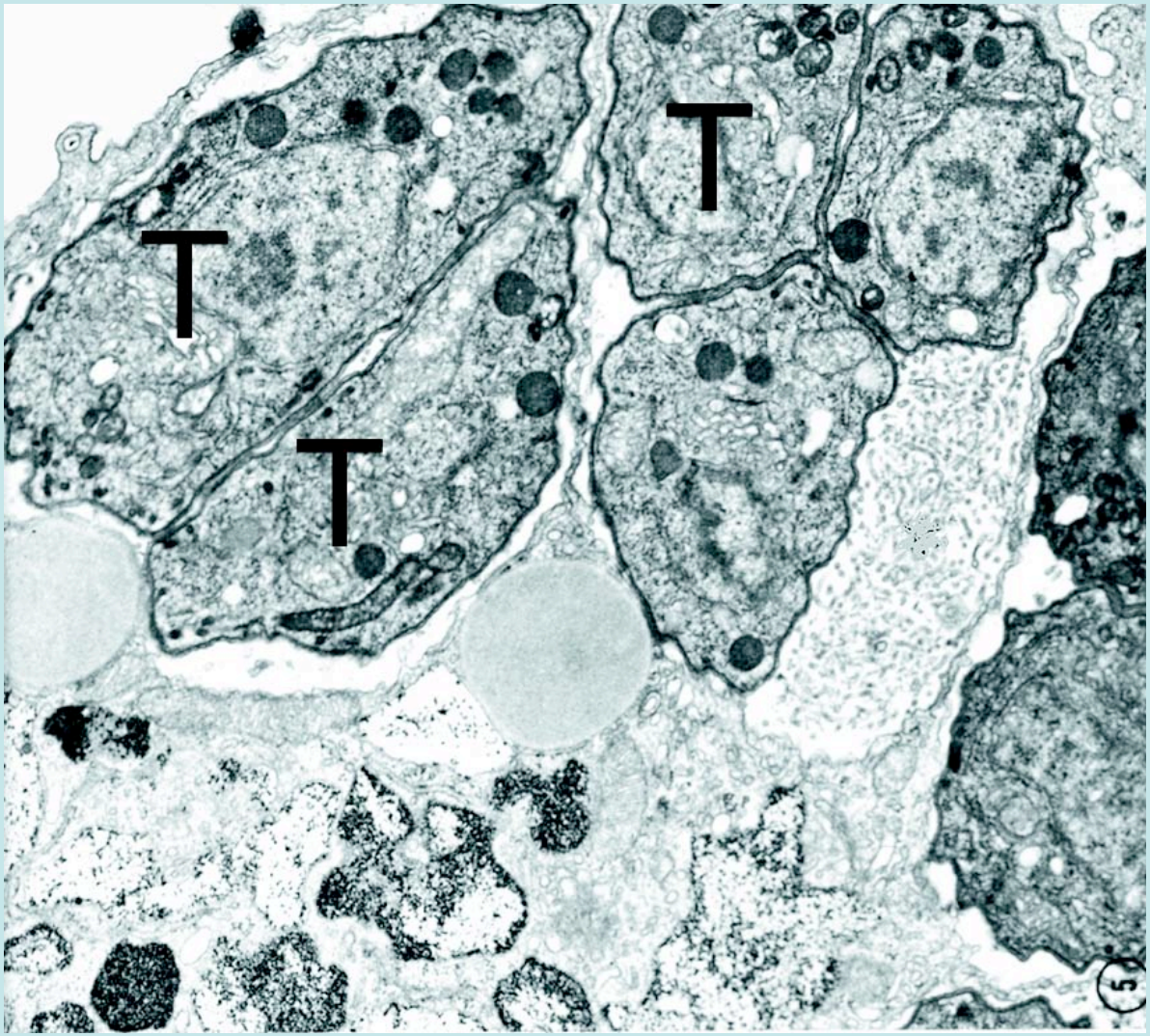
R - rhoptres; C- conoid; MN - micronemes; DG - dense granules; N - nucleus

Macrophage Infected With *Toxoplasma gondii**



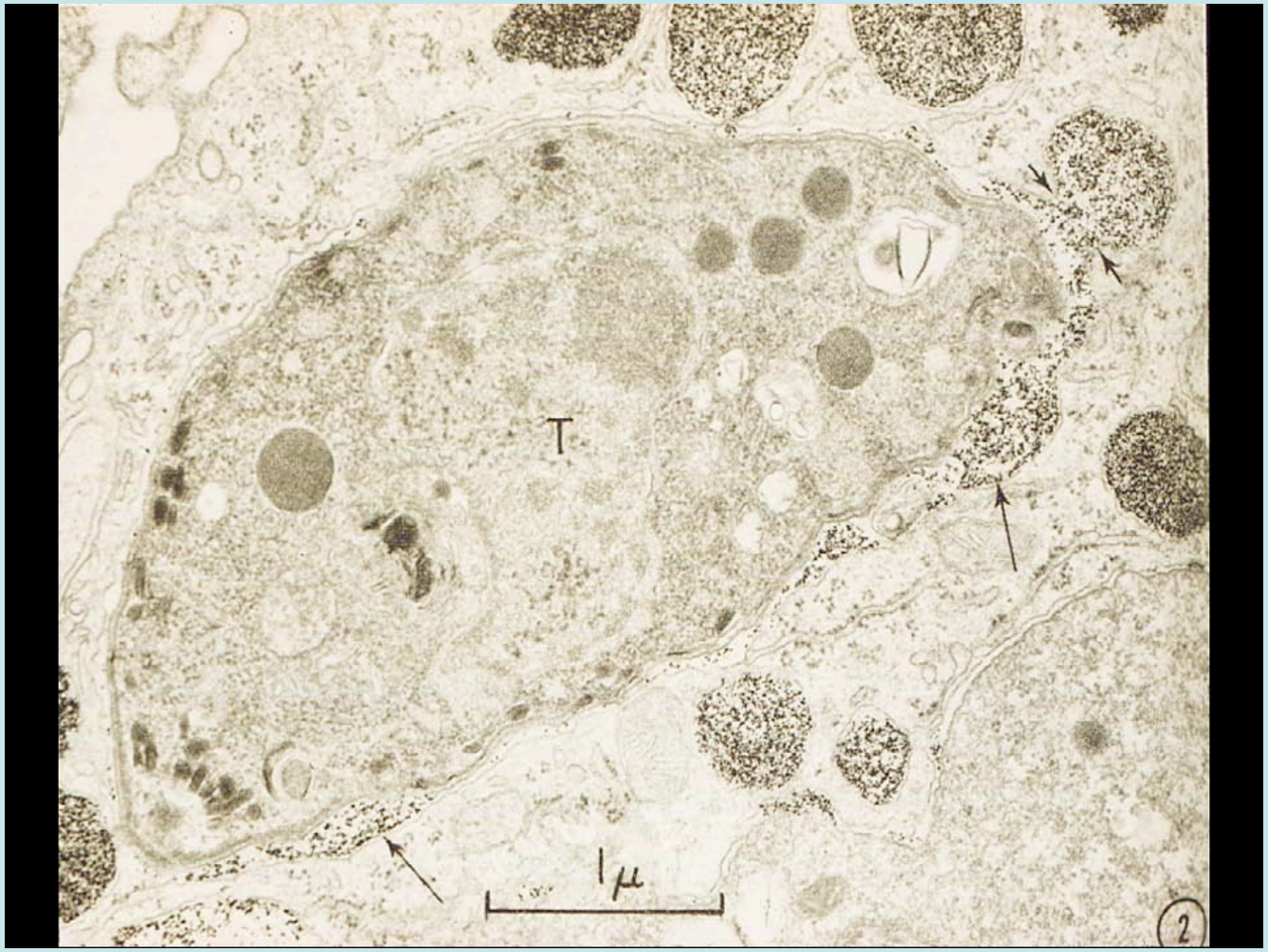
* The hunter becomes the hunted

Toxoplasma gondii in culture



Trophozoites (T) prevent fusion of lysosomal menebranes to the parasitophorous vacuole, thereby escaping digestion

Toxoplasma gondii in culture

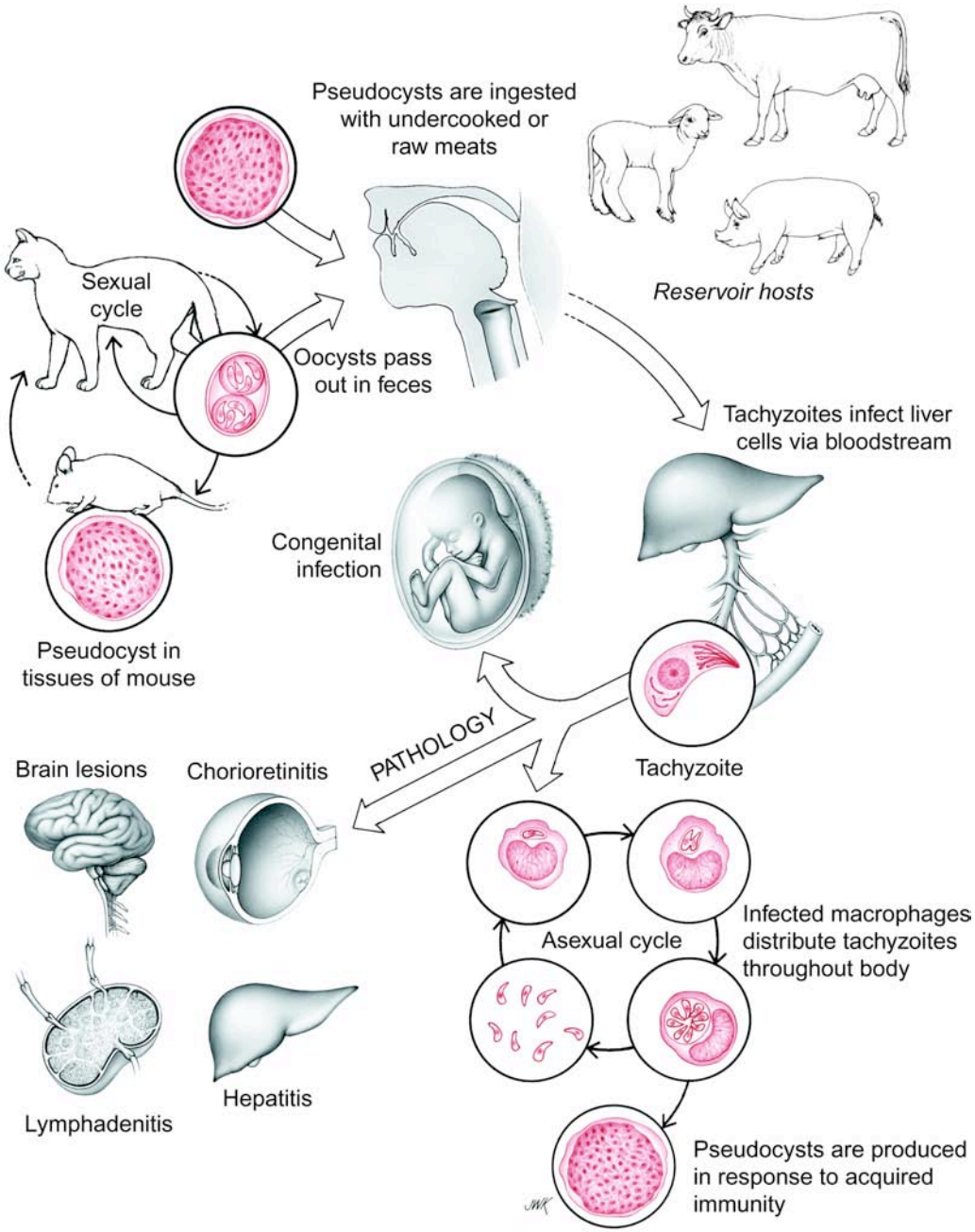


Heat-killed organisms cannot prevent fusion of lysosomal membranes with the parasitophorous vacuole

Felines are the definitive hosts for *Toxoplasma gondii*

Rack of lamb is usually served rare

Toxoplasma gondii



Oocysts of *Toxoplasma gondii*

Clinical Disease:

Congenital

Adult-acquired

AIDS-related

Congenital Toxoplasmosis

Congenital Toxoplasmosis:

Still Birth

Chorioretinitis

Mental Retardation

Adult-Acquired Toxoplasmosis

Adult-Acquired Toxoplasmosis

Signs and symptoms:

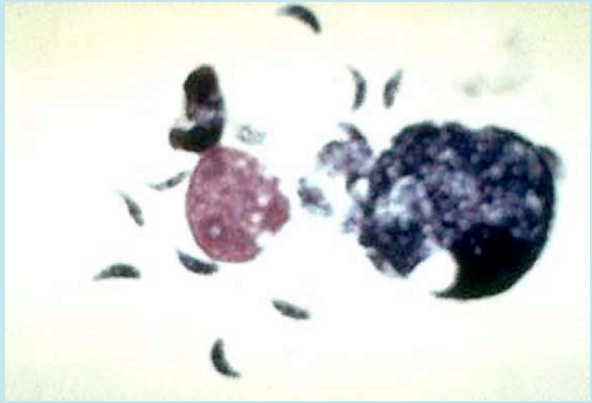
- Lymphadenopathy
- Fever
- Headache
- Chronic Malaise

AIDS-related Disease

AIDS-related Disease:

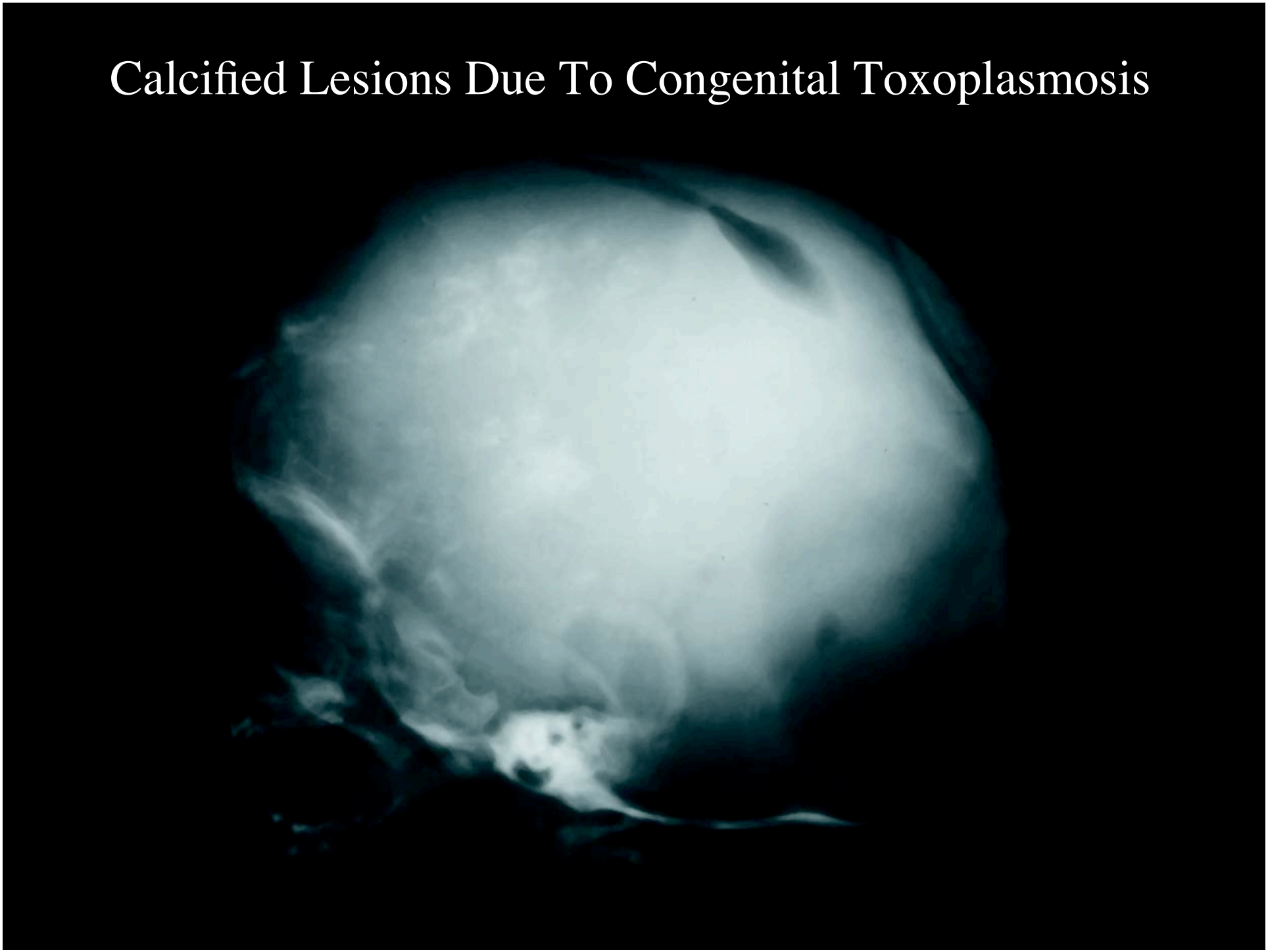
1. CD4 < 200 and reactivation of latent infection

2. Encephalitis
    1. Diffuse inflammation and swelling
    2. Localized ring enhancing lesions on CT scan
    3. Herniation
    4. Death if untreated



Pathology

Calcified Lesions Due To Congenital Toxoplasmosis



Congenital Toxoplasmosis

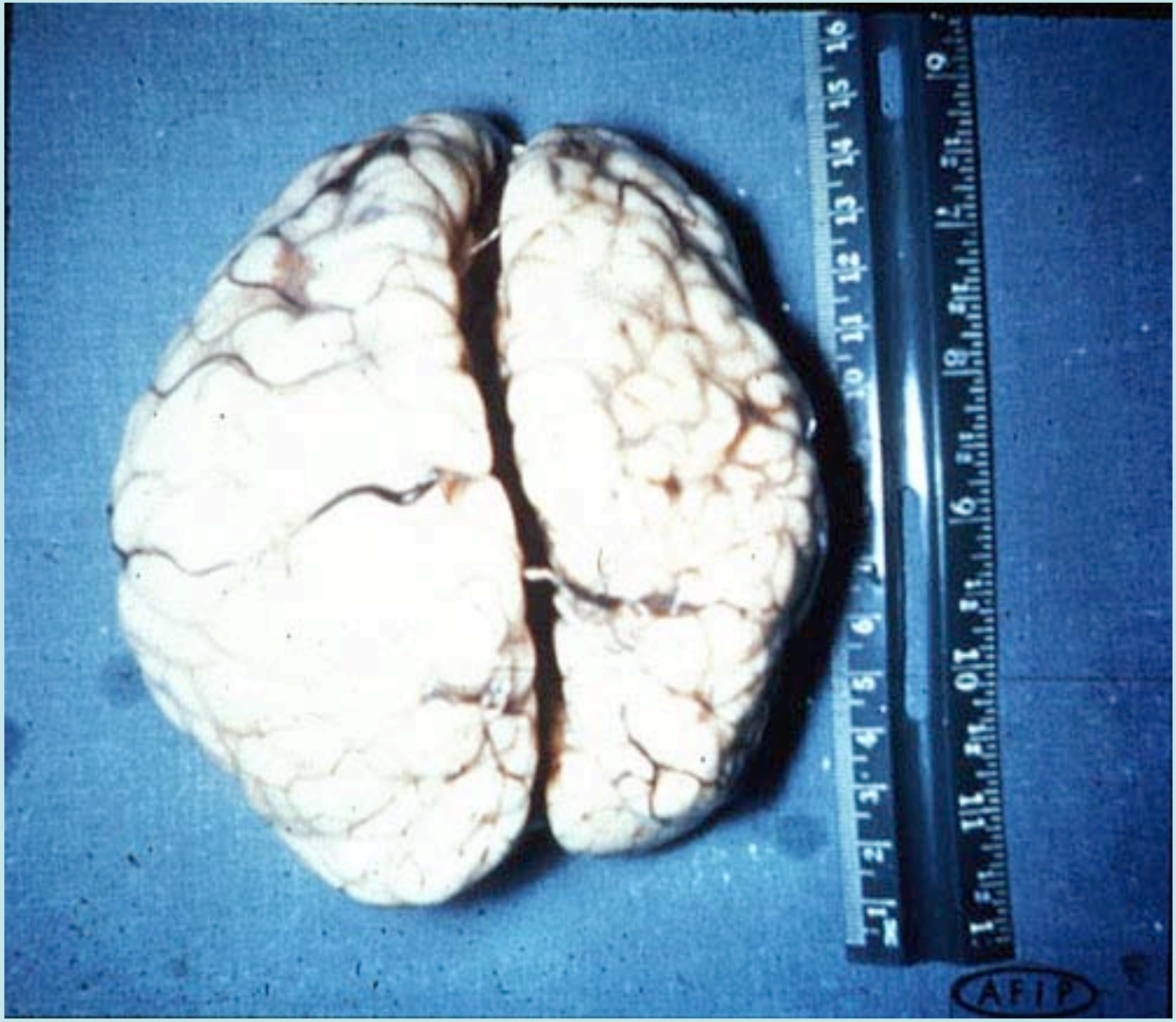
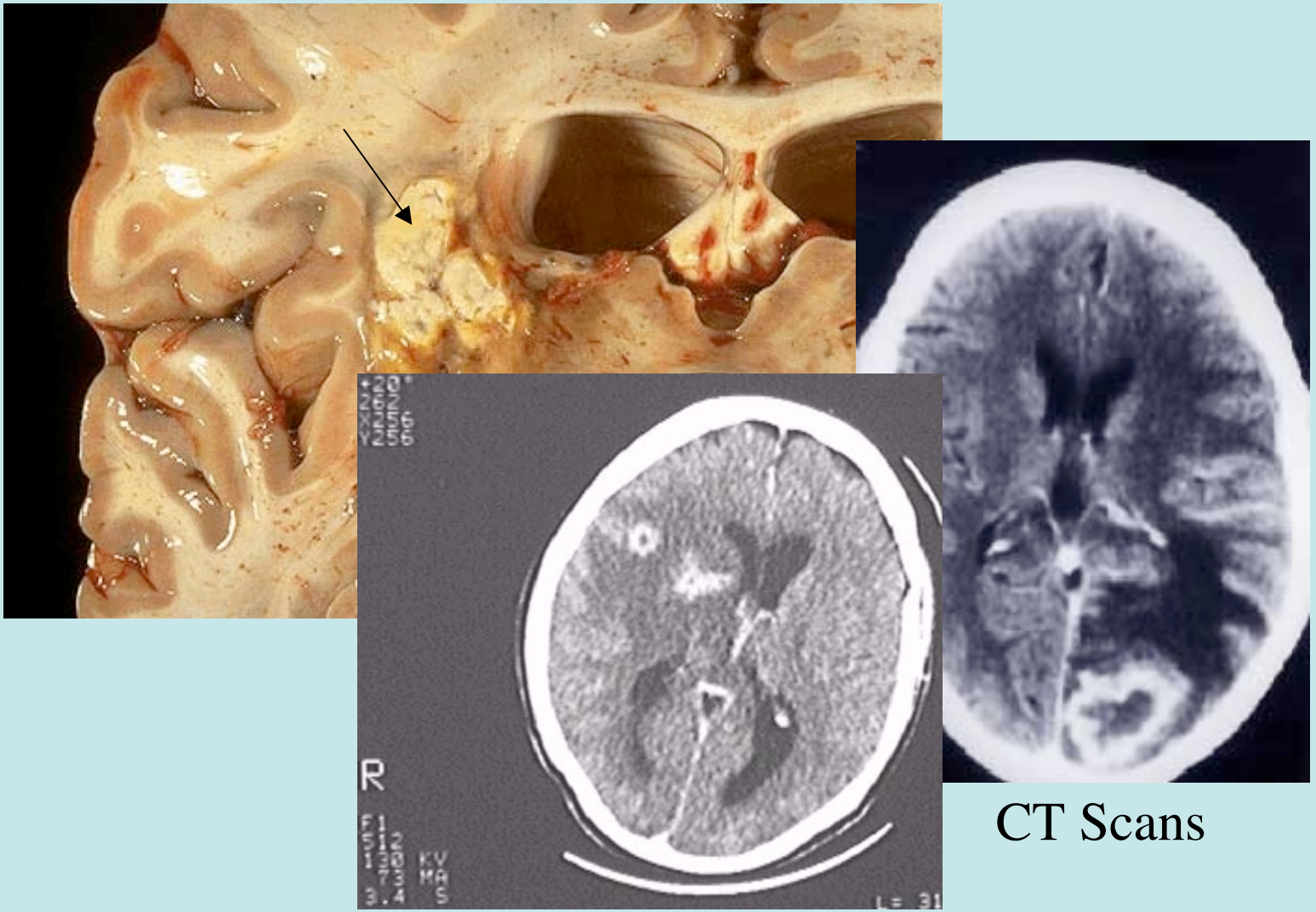


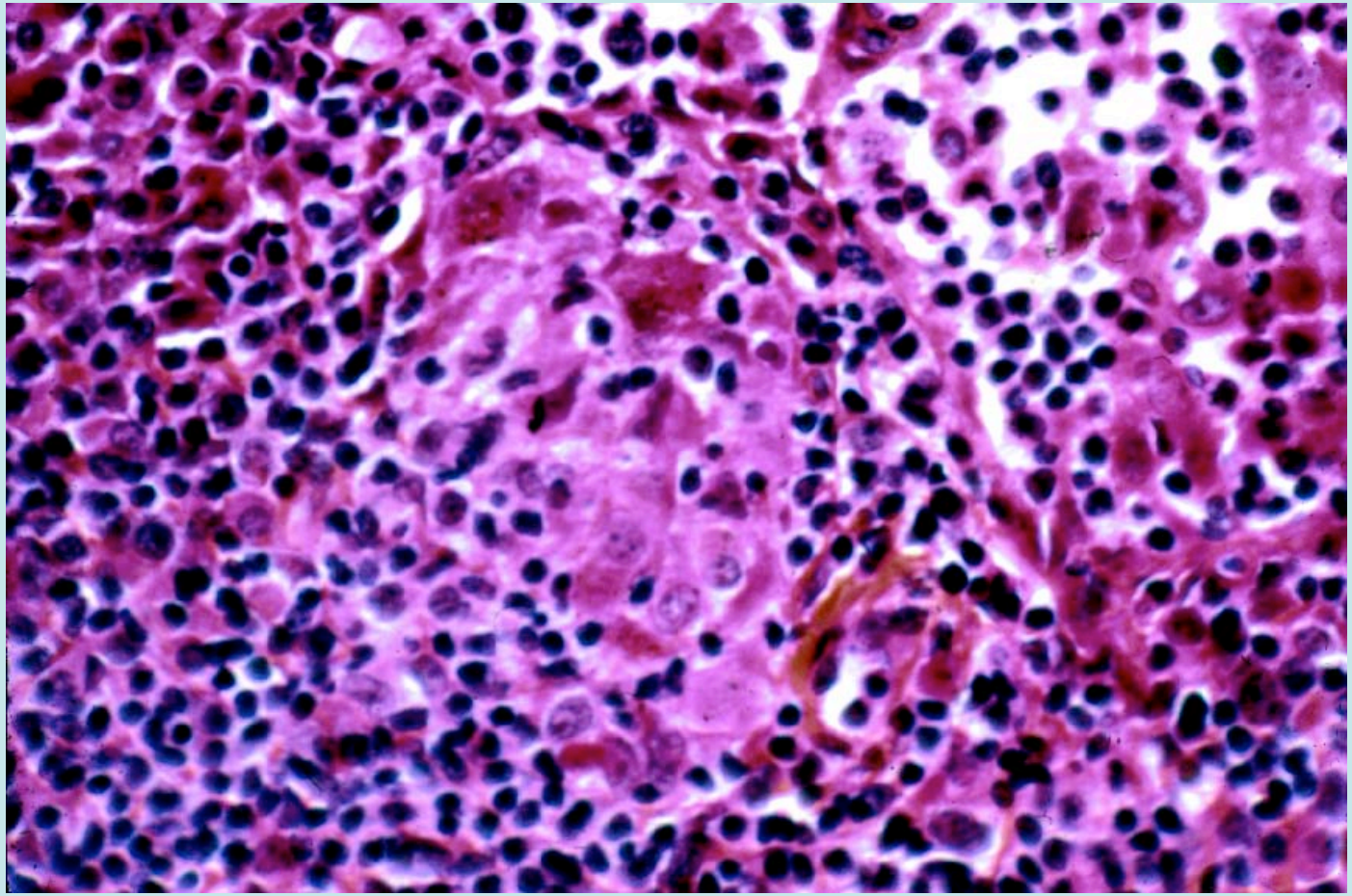
Photo courtsey: Gary Baumbach, M.D., Department of Pathology, University of Iowa College of Medicine

Toxoplasma abscess in the brain would appear as a ring-enhancing lesion with CT scan.

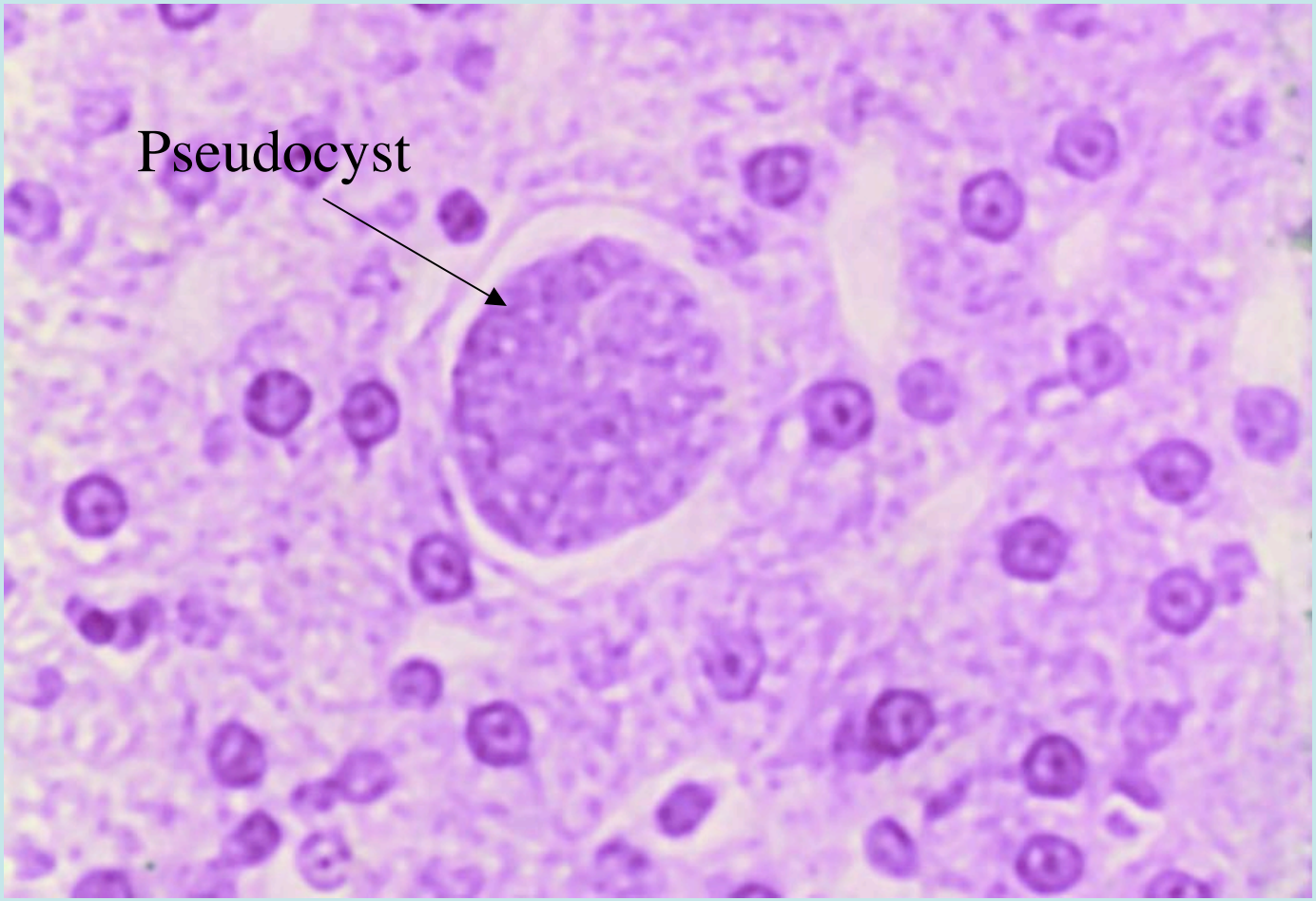


CT Scans

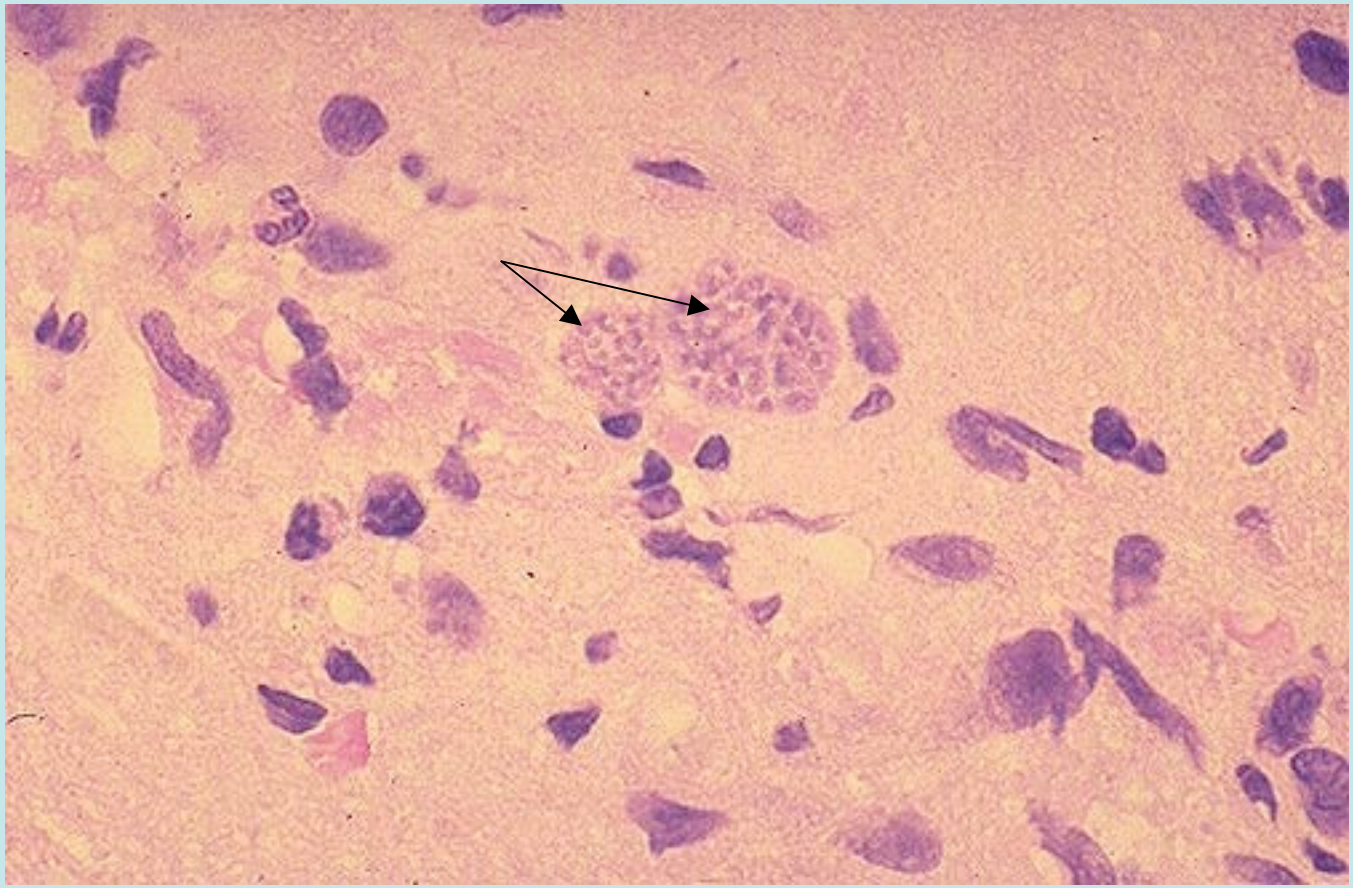
Histopathology of *Toxoplasma gondii:*
organisms are hard to demonstrate
by microscopic examination



Pseudocyst of *Toxoplasma gondii* in Liver



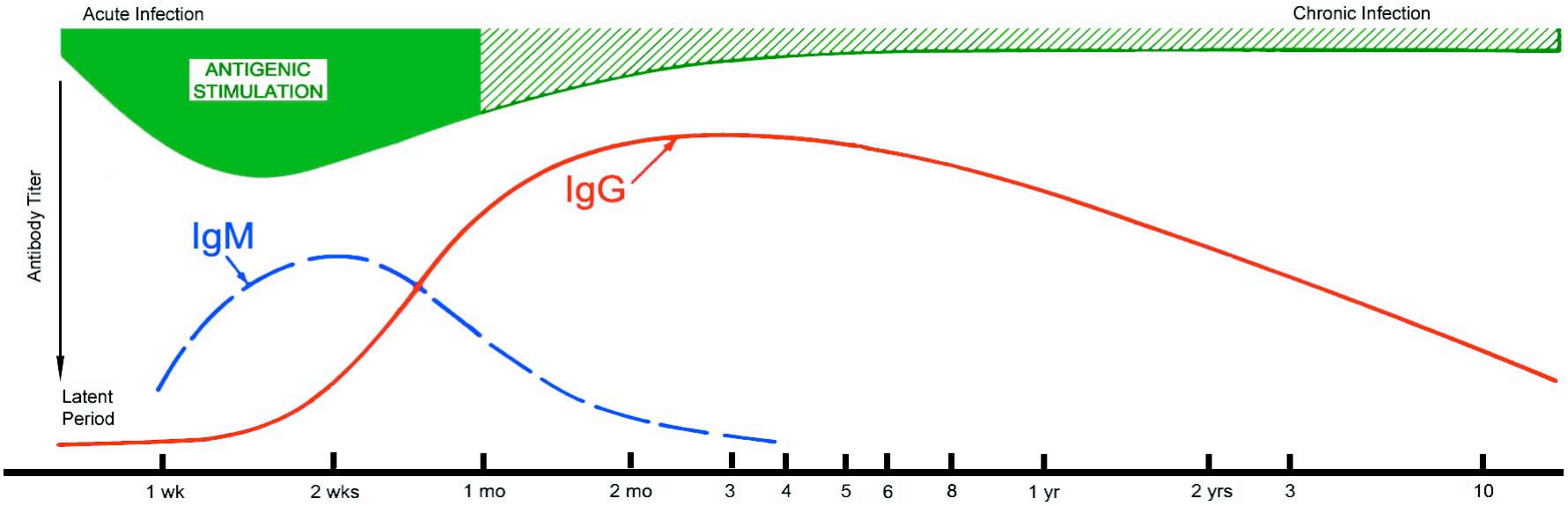
Pseudocysts of *Toxoplasma gondii* in a microglial nodule
with a variety of inflammatory cell types
in an HIV/AIDS patient



Differential Diagnosis of Lymphadenopathy

	Toxoplasmosis	*Inf. Mono*	*Lymphoma*
Lymphadenopathy Without Other Symptoms	+++	+	+++
Pharyngitis	+	+++	+
Monocytosis, Eosinophilia	+++	+	+++
Atypical Lymphocytes	+	++++	+
Anemia	0	+	+++
Positive Heterophil	0	++++	0
Altered Liver Function	0	++++	++
Hilar Lymphadenopathy	+	+	+++
Lymph Node Pathology	Reticulum Cells	Germinal Cells	Bizarre Cells

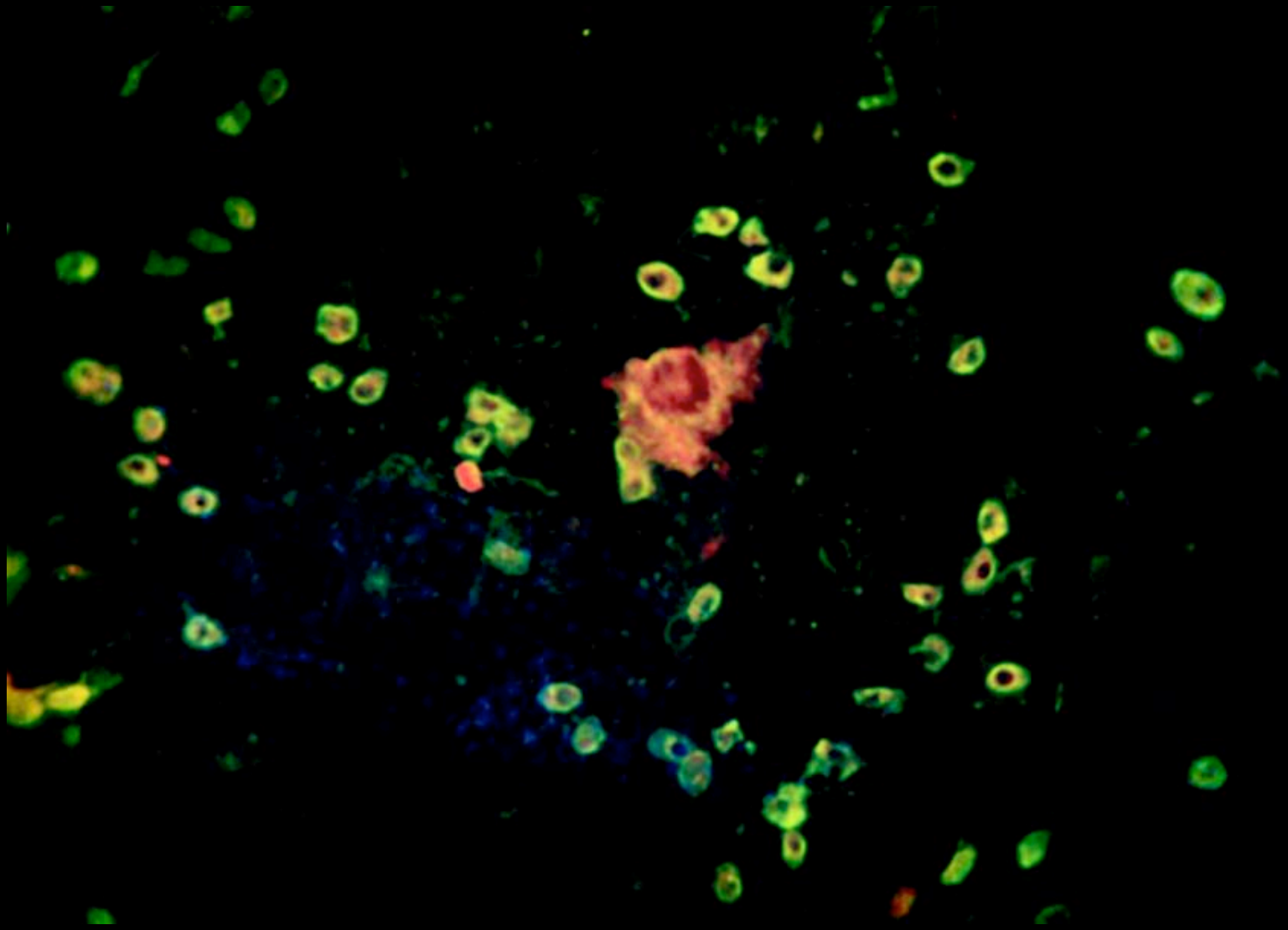
Serological correlates in acute and chronic infection



Serologic Detection of Toxoplasma During Pregnancy

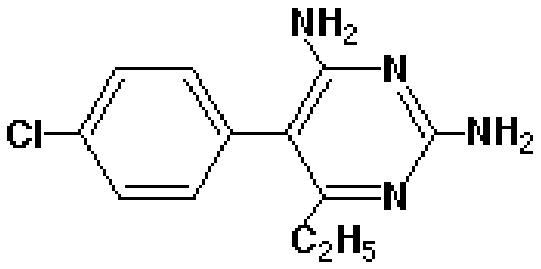
Test 1 (before 2 months of pregnancy)	Test 2 (in second trimester)	Test 3 (in third trimester)	Group
IgG +ve (any titer);	No test;	No test;	I Infection before pregnancy;
IgM –ve	no treatment	No treatment	no risk (Note 1)
IgG +ve;	Repeat IgG after 3 weeks;		II Possible infection soon after conception;
IgM +ve	treat if high or rising titer		slight risk (Note 2)
IgG –ve	Treat if IgG +ve;	Treat if IgG +ve;	III No previous infection;
IgM –ve	Don't treat if IgG –ve	Don't treat if IgG –ve	if seroconversion, high risk (Note 3)

Indirect Fluorescent Antibody (IFA)Test

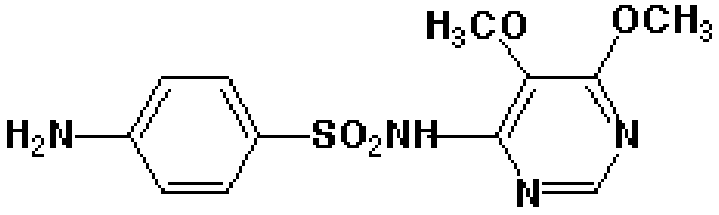


Drugs Of Choice:

Pyrimethamine and Sulfadoxine



Pyrimethamine



Sulfadoxine

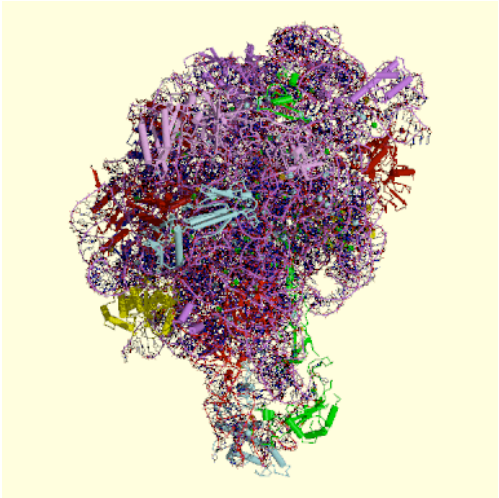
Modes of action:

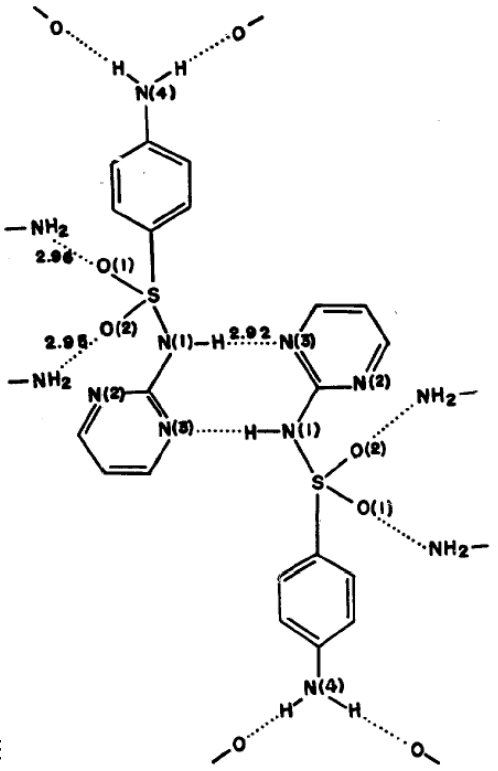
1. Pyrimethamine inhibits DNA synthesis by interfering with folate synthesis

2. Sulfadoxine prevents PABA synthesis by inhibiting the enzyme dihydropteroate synthetase

Alternate Drugs:

Spiramycin and Sulfadiazine





Modes of Action:

A. Spiramycin inhibits RNA synthesis

B. Sulfadiazine inhibits PABA synthesis by interfe
dihydropteroate synthetase

Prevention:

1. Prevent pregnant women from handling cat litter

2. Avoid eating raw or under-cooked meats

Trained cat

Automated litter collection box