Toxoplasma gondii

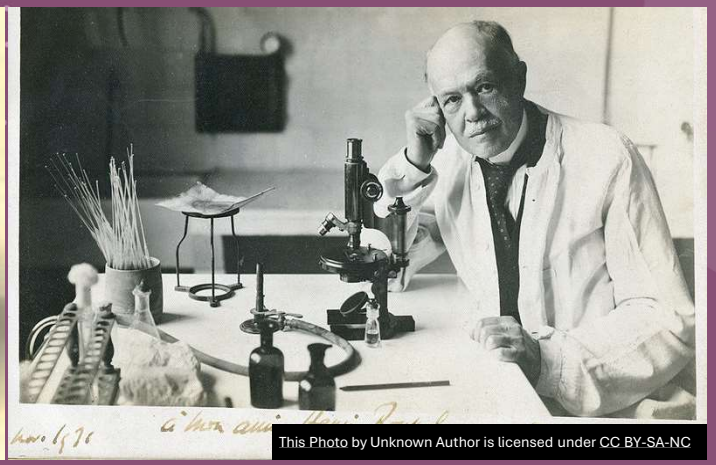
By: Adrianna Gonzalez

Taxonomy

- Kingdom: Protista
- Phylum: Apicomplexa
- Class: Conoidasida
- Order: Eucoccidiorida
- Family: Sarcocystidae
- Genus: Toxoplasma
- Species: *Toxoplasma gondii*

History

- Charles Nicolle and Louis Manceaux (1908)
- Alfonso Splendore (1908)

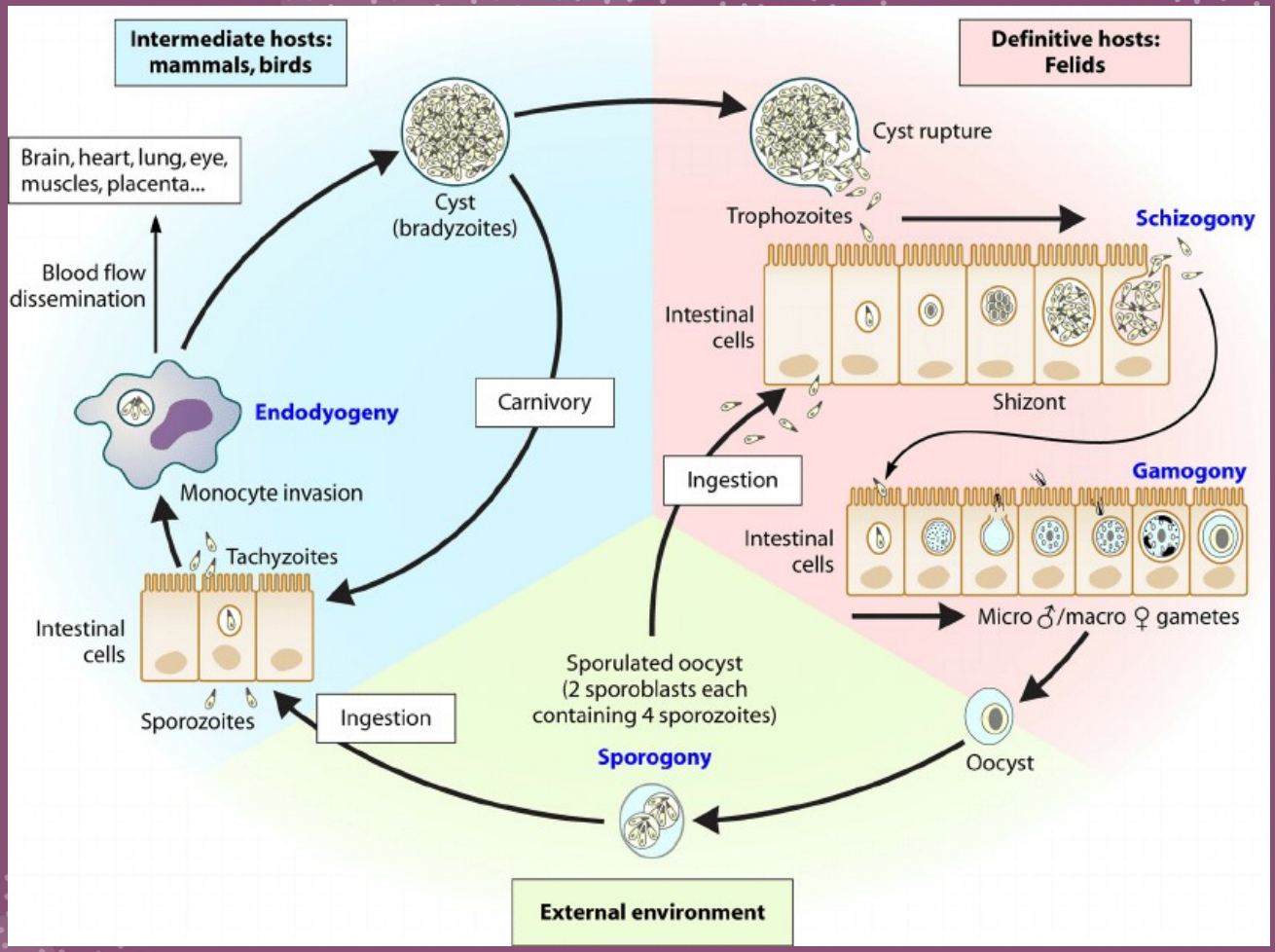


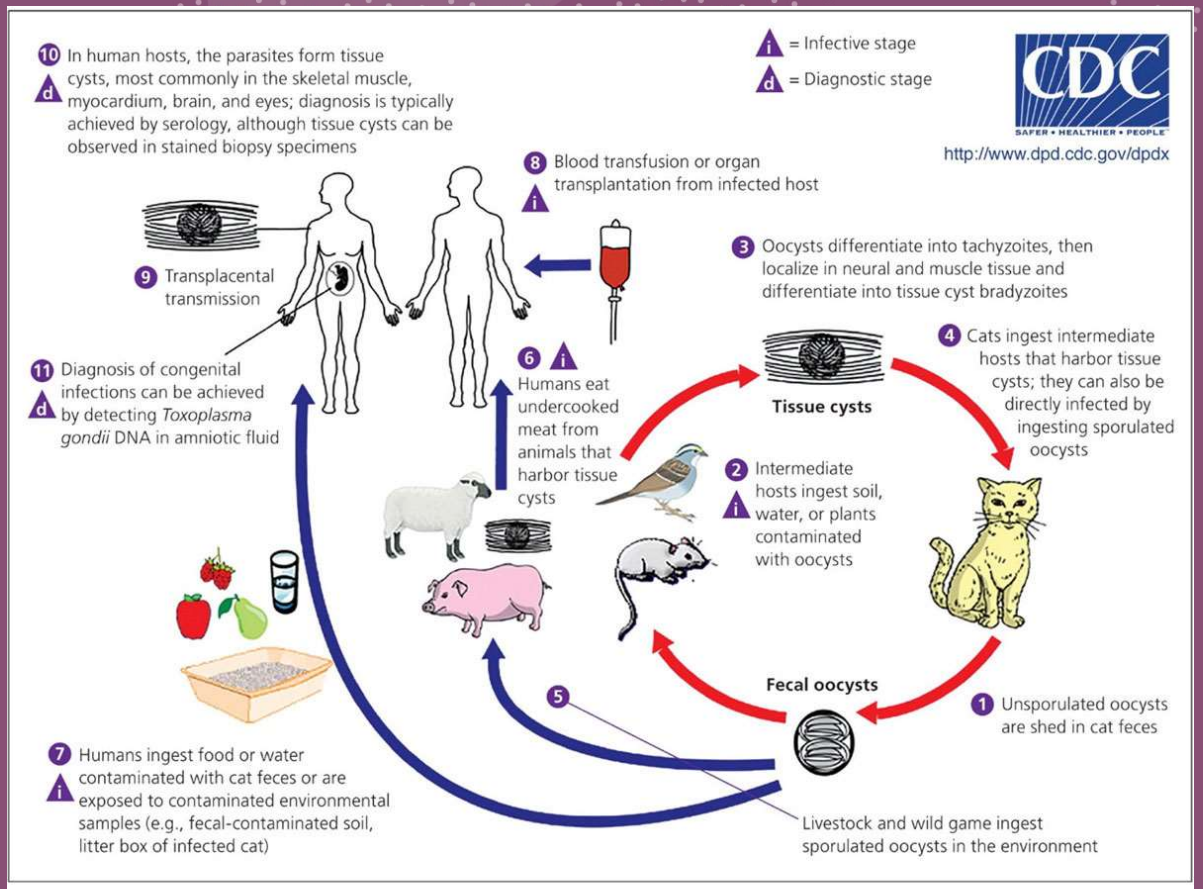
Life Cycle

- Felidae Family
  - Carnivorism
  - Directly ingesting sporulated oocysts
- Humans
  - Undercooked/Raw Meat
  - Contaminated Food/Water
  - Transplacentally

Life Cycle

- Unsporulated oocysts in cat feces
- Sporulation 1-5 days
- Ingested Oocysts -> Tachyzoites -> Tissue Cyst Bradyzoites


Intermediate hosts: mammals, birds
Definitive hosts: Felids
Brain, heart, lung, eye, muscles, placenta...
Cyst (bradyzoites)
Cyst rupture
Trophozoites
Schizogony
Blood flow dissemination
Intestinal cells
Shizont
Endodyogeny
Carnivory
Ingestion
Gamogony
Monocyte invasion
Tachyzoites
Intestinal cells
Micro ♂/macro ♀ gametes
Sporulated oocyst (2 sporoblasts each containing 4 sporozoites)
Sporozoites
Ingestion
Oocyst
Sporogony
External environment

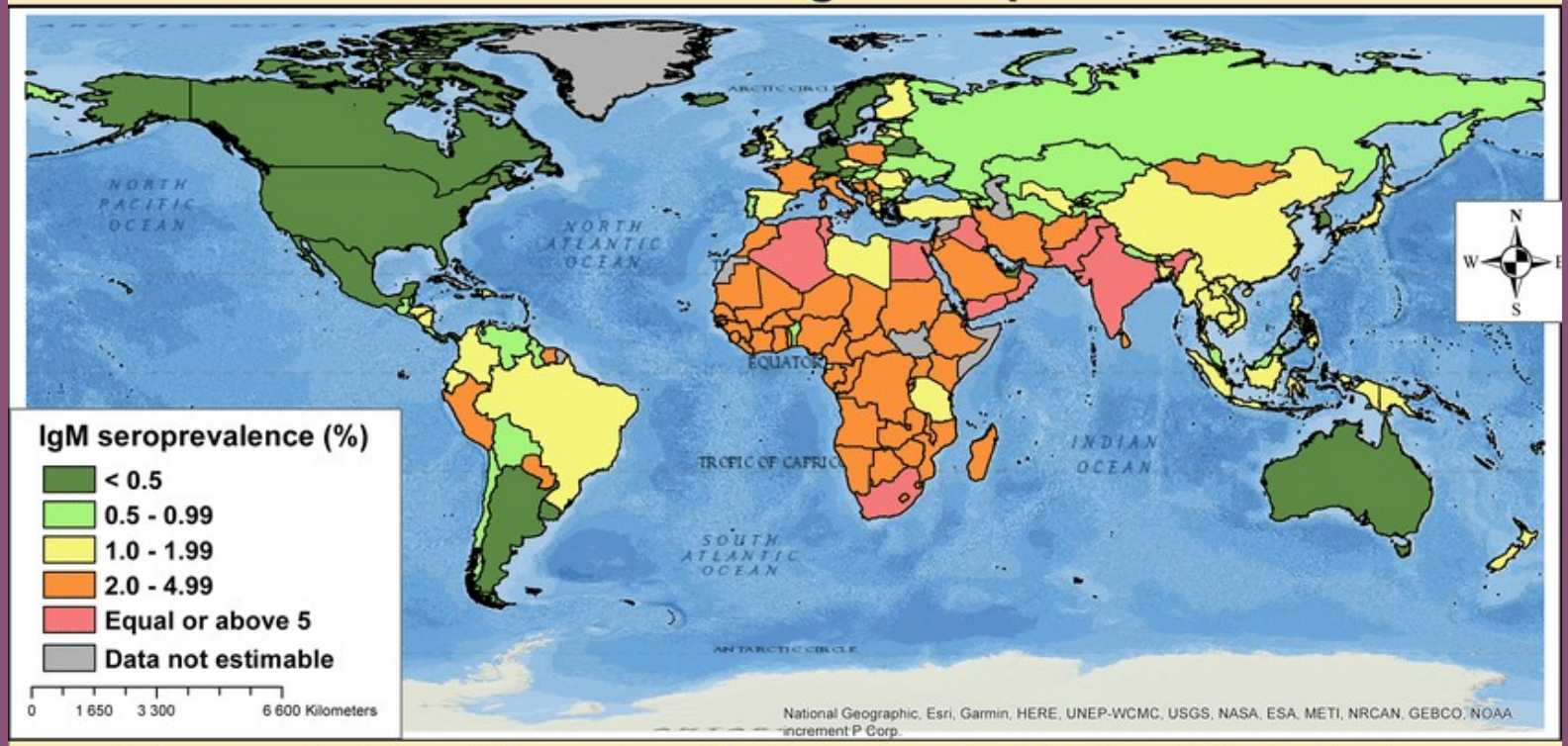


Cycle parasitaire de Toxoplasma gondii

Epidemiology

- Worldwide
- Low Host Specificity
- 20-30% of the U.S.

Global distribution of IgM seroprevalence



Data were estimated for 191 countries and territories including 45 in Afrca, 41 in The Americas, 20 in Eastern Mediterranean, 52 in Europe, 10 in South-East Asia, and 23 in Western Pacific

Pathogenicity

Acute	Chronic	Congenital
• Swollen lymph nodes • Fever • Headache • Anemia • Muscle Pain	• Depends on Host Immune Response • CNS Damage • Lesions in lungs, liver, brain, eyes and heart	• Depends on time of infection • Chorioretinitis • Hydrocephalus • Intracranial Calcification

Prevention/Control

- Cook food thoroughly
- Clean fruits and vegetables
- Wash hands and instruments
- Avoid cats
- Unless pregnant, change litter box daily

Treatment

- Pyrimethamine and Sulfadiazine
- Spiramycin
- No Vaccine

Video

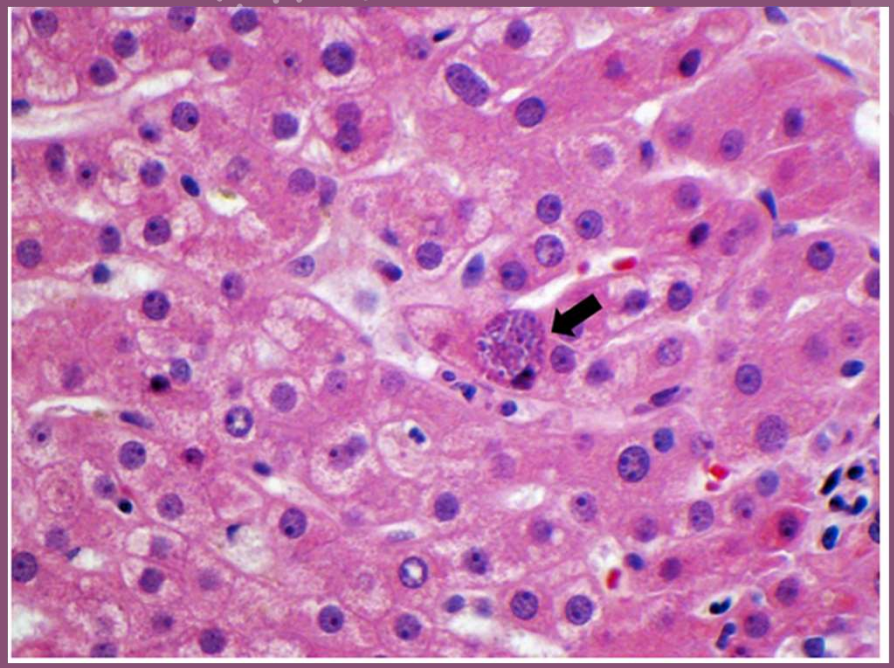
Clinical Case Studies

Case Study #1

About Patient:	Symptoms:
• 61 year old female • Had liver transplant 5 weeks before	• Fever • Altered mental status

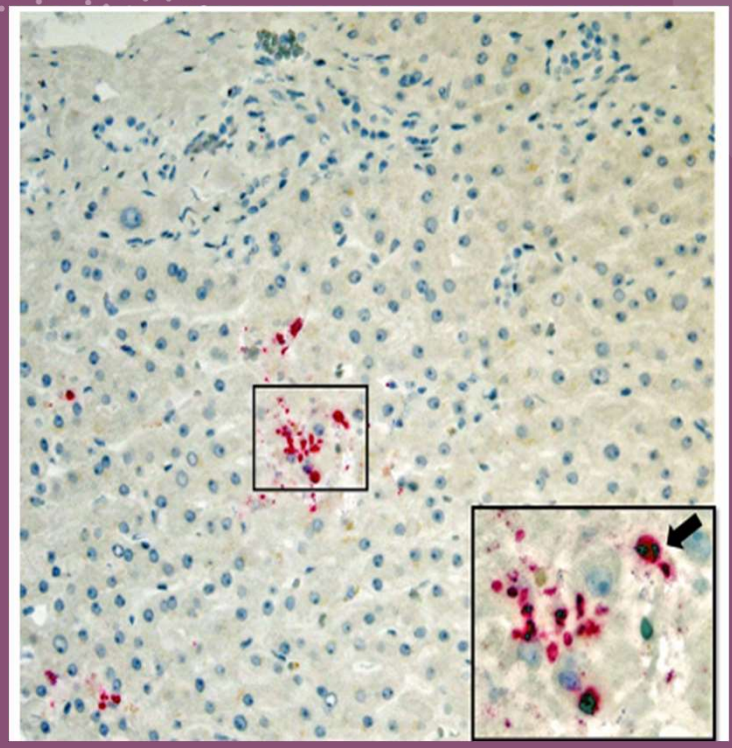
Case Study #1

- Lab Evaluations
  - IgG Test: Positive
  - Liver biopsy:
    - CMV hepatitis
    - Hepatocyte necrosis
    - Presence of bradyzoite cysts



Case Study #1

- Patient developed fulminant liver failure
- After death, donor data revealed *Toxoplasma* IgG positive



Case Study #1

- Treatment:
  - Intravenous ganciclovir

Case Study #2

About Patient:
• Male from Mother's 2nd pregnancy (38th week) • After 26 weeks of pregnancy, Mother refused exams • Visited clinic day after birth

Symptoms:
• Slightly cloudy amniotic fluid • Immediate respiratory issues • Enlarged head

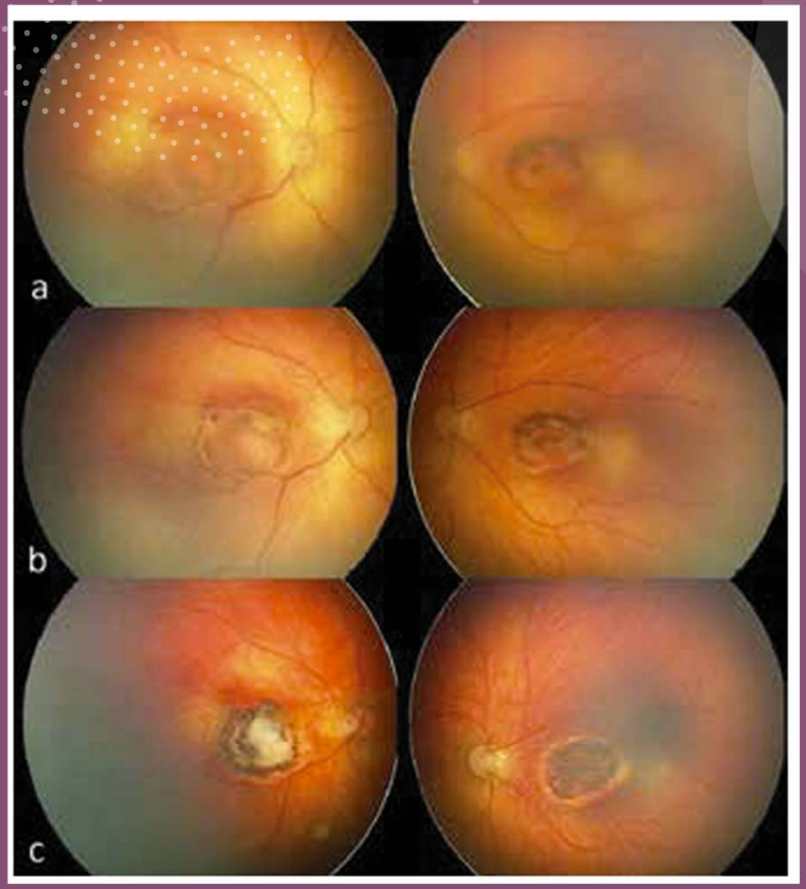
Case Study #2

- Physical Examination:
  - Large Head (38.5 cm)
- Lab Evaluations
  - IgG Test: Positive
  - Hydrocephalus confirmed
  - Dilated brain ventricles
  - Chorioretinitis confirmed

Patient Value	Normal Range
38.5 cm	32.5-37.5 cm
Positive (179.63 IU/mL)	Negative (<9 IU/mL)

Case Study #2

- A: 2 weeks after birth
  - Active inflammation
- B: After some treatment
  - Reduced inflammation and signs of scarring
- C: Atrophic scars seen
  - Indicates permanent damage



Case Study #2

- Treatment
  - Pyrimethamine
  - Sulfadiazine
  - Calcium folinate

Case Study #3

Patient Background:
• 62 year old female • Severe Rheumatoid Arthritis (10 years) • Diabetes • Hypothyroidism

Symptoms:
• 2 weeks of: • Temporal Disorientation • Unsteady Gait

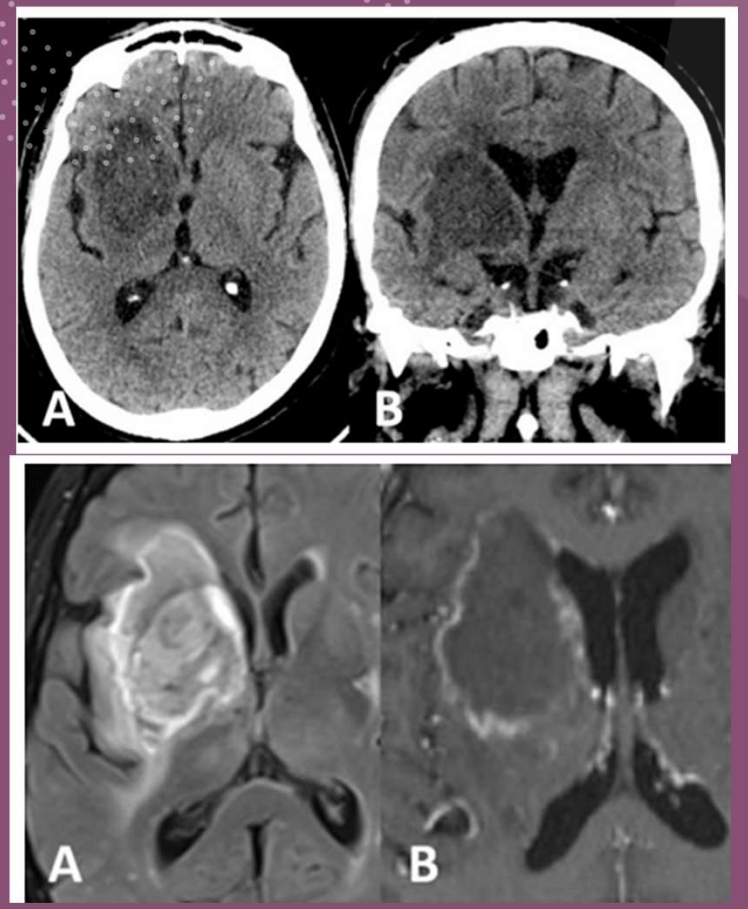
Case Study #3

- Neurologic Examination:
  - Moderate left hemiparesis
- Lab Evaluations
  - IgM Test: Negative
  - IgG Test: Positive
  - Neutrophilia (89%)

Patient Value	Normal Range
Negative (<10 IU/mL)	Negative (<10 IU/mL)
Positive	Negative (<9 IU/mL)
89% of WBC	40-70% of WBC

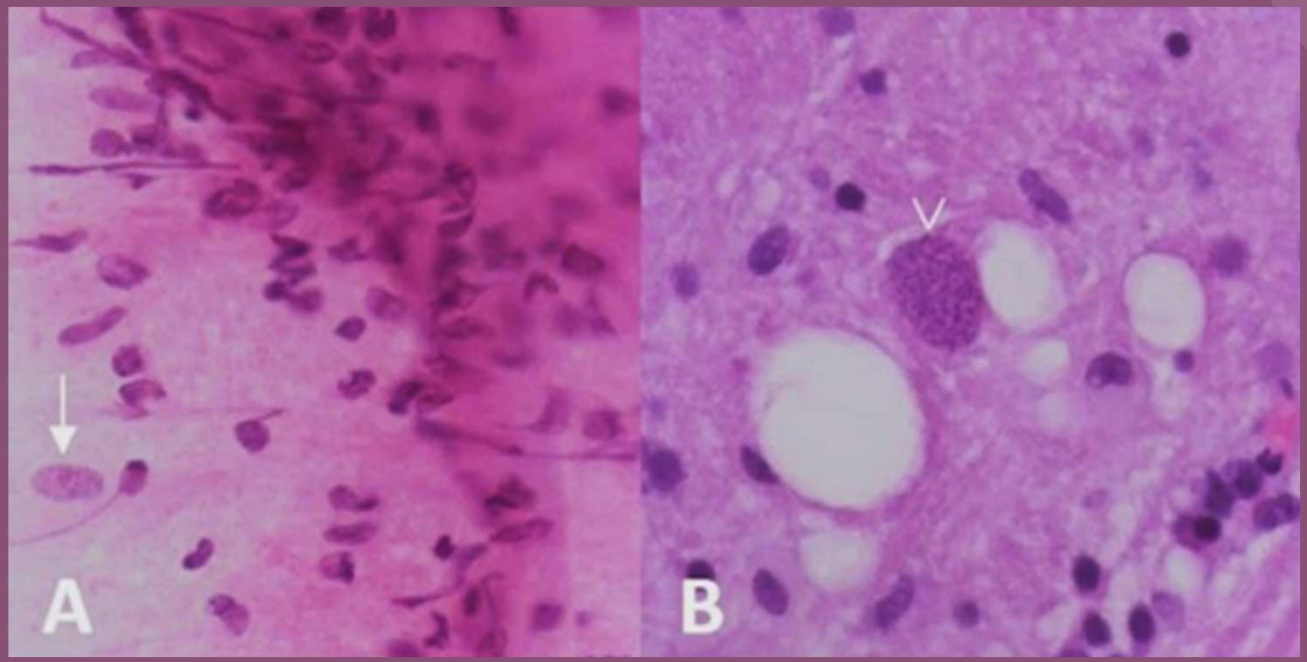
Case Study #3

- CT Scan/MRI revealed:
  - Localized lesion in right basal ganglia of brain
    - Surrounded by Edema



Case Study #3

- Biopsy/Brain Smear
  - Cysts with bradyzoites
  - Confirmed Cerebral Toxoplasmosis



Case Study #3

- Treatment:
  - Dexamethasone (0.5 mg daily)
  - Pyrimethamine (75 mg/day)
  - Folinic acid (10 mg/day)
  - Sulfadiazine (1 g q6h)

Question #1

- How did the patient from Case Study #1 get infected?

Question #1

- How did the patient from Case Study #1 get infected?
  - Organ Transplantation

Question #2

- What were the 2 major conditions the patient from Case Study #2 had that are associated with toxoplasmosis?

Question #2

- What were the 2 major conditions the patient from Case Study #2 had that are associated with toxoplasmosis?
  - Hydrocephalus
  - Chorioretinitis

References

- About Toxoplasmosis | Toxoplasmosis | CDC
- CDC - DPDx – Toxoplasmosis
- PD7ClinicalAppendix-HighRes.pdf (parasiteswithoutborders.com)
- CDC - DPDx – Toxoplasmosis
- Control of human toxoplasmosis – ScienceDirect
- (PDF) Global, regional, and country seroprevalence of Toxoplasma gondii in pregnant women: a systematic review, modelling and meta-analysis (researchgate.net)
- Acute Liver Failure Due to Toxoplasmosis After Orthotopic Liver Transplantation - PubMed (csustan.edu)
- Congenital central toxoplasmic chorioretinitis - case study - PubMed (csustan.edu)
- Cerebral Toxoplasmosis as an Uncommon Complication of Biologic Therapy for Rheumatoid Arthritis: Case Report and Review of the Literature - PubMed (csustan.edu)