

Cryptosporidium

- ▣ Protozoan
- ▣ Phylum: Apicomplexa
- ▣ Class: Sporozoasida
- ▣ Order: Eucoccidiida
- ▣ Family Cryptosporiidae
- ▣ Genus: *Cryptosporidium*
- ▣ Species: *parvum*, *muris*, *meleagridis*, *felis*, etc.

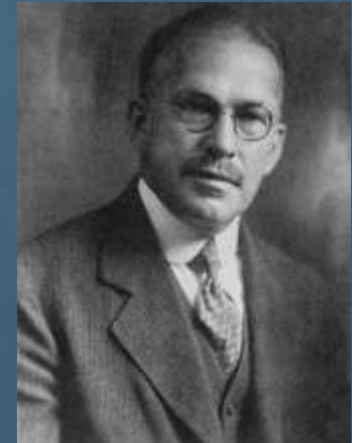


waterfilterreview.com



Cryptosporidium History

- ▣ Recognized in mice in 1907
- ▣ Reported in humans in 1976
 - Immunocompetent child
 - Immunosuppressed adult
- ▣ Recognized globally in 1980s and 1990s
 - AIDS patients
 - Outbreak among veterinary students



www.nap.edu

Ernest Edward Tyzzer



Cryptosporidium

- ▣ Cryptosporidium is a spore producing parasite found in the intestine of infected people and animals.
- ▣ Cryptosporidium spp. is the most common cause of Cryptosporidiosis.



landesbioscience.com



Cryptosporidiosis Infection

▣ Infection

- Ingesting food or drinks contaminated with fecal material
- Swallowing recreational water contaminated with *Cryptosporidium*
- Not washing hands
- Sexual practices leading to oral exposure with fecal material



secretsofsoa.com

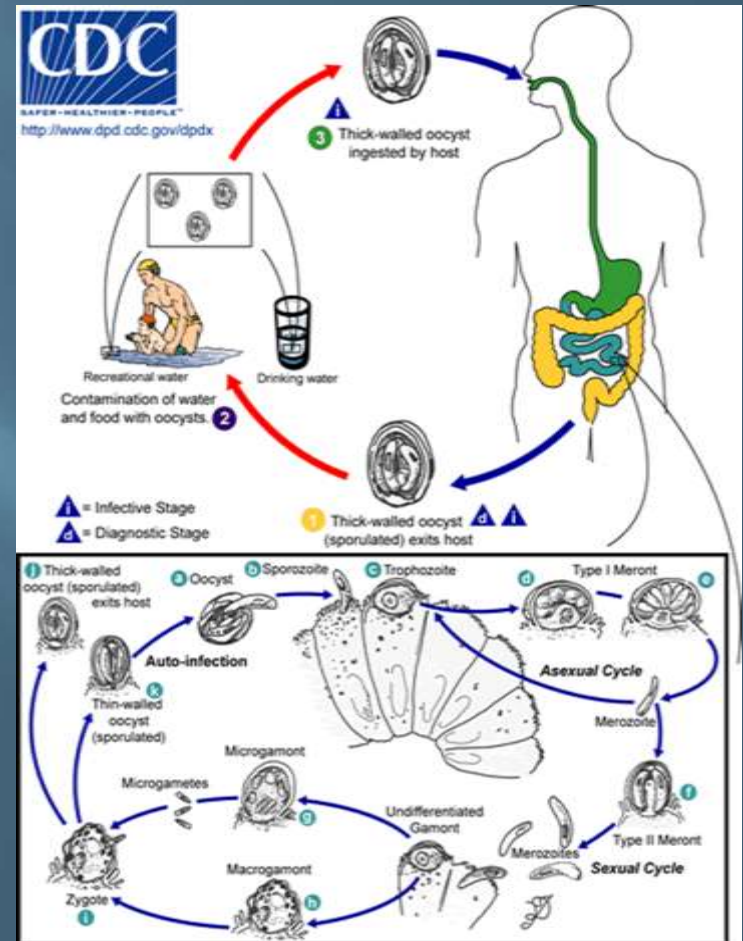


victorystore.com



Etiology

- Buries into intestinal lining of the gut
 - Goes through Life Cycle
- Alters osmotic pressure
 - Diarrhea
- Atrophy of intestinal villi
 - Alters uptake of fluids, electrolytes, and nutrients
 - Malabsorption syndrome



Symptoms

- ▣ Symptoms (2 to 10 days after infection and can last up to 30 days)
 - Diarrhea
 - Stomach cramps
 - Dehydration
 - Nausea
 - Vomiting
 - Fever
 - Weight loss
 - Sometimes no symptoms are seen



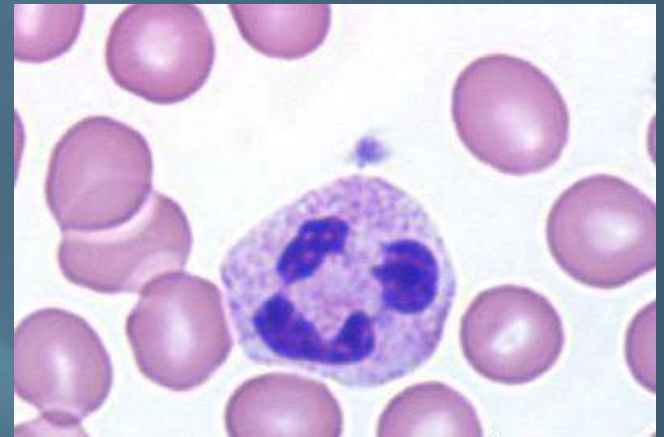
treehugger.com



bathroomscalereview.com

Innate Immune Response

- ▣ White Blood Cells
 - Phagocytize Parasites
 - Segmented neutrophils
 - Macrophages
 - Lymphocytes
 - Eosinophils

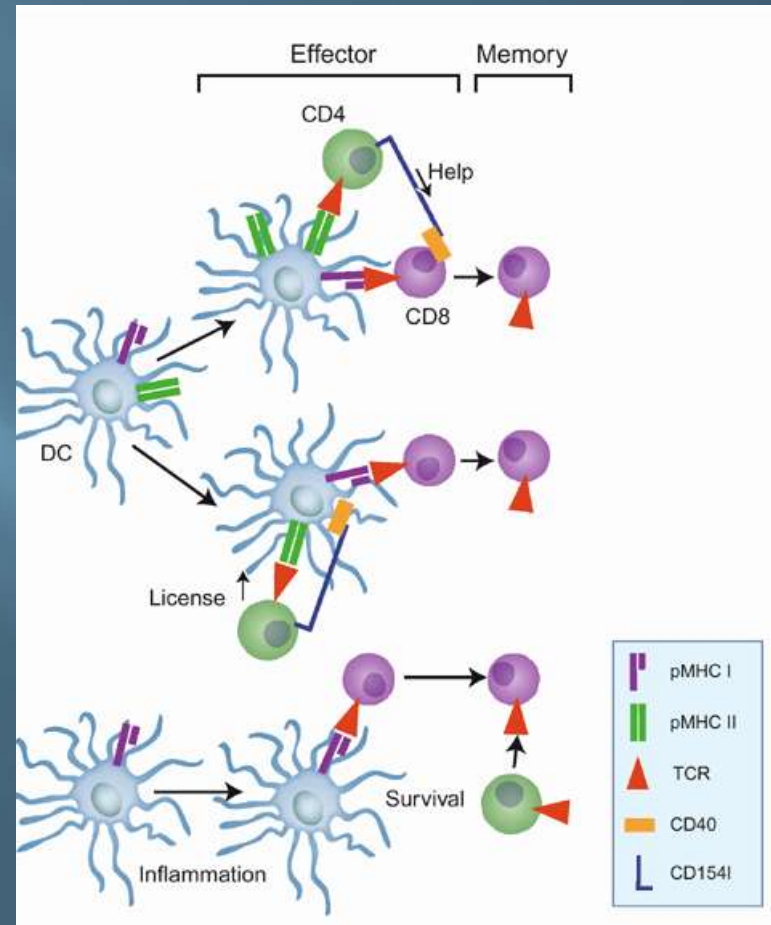


labmed.hallym.ac.kr



Cell Mediated Immune Response

- CD4⁺ T cells
 - Early infection
- CD8⁺ T cells
 - Elimination
- CD154 and CD40
 - Stimulate nitric oxide
 - IFN- γ , IL-12
 - T cell response
 - Apoptosis
- Other Cytokines
- TNF- α , IL-1 β , IL-2, IL-4, IL-10, IL-15, etc.
- Patients with AIDS
 - Decreased CD4⁺ count

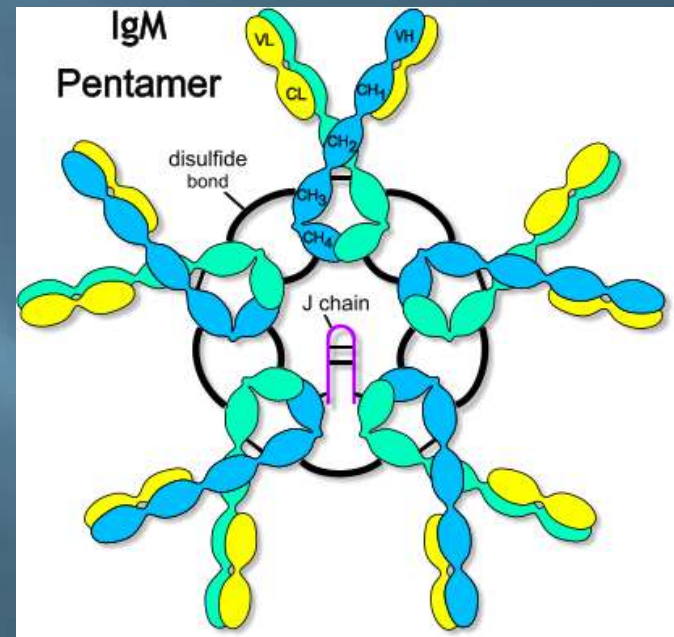


Ashton-Rickardt, 2004



Humoral Immune Response

- ▣ IgM
- ▣ IgG
- ▣ IgA
- ▣ X-linked immunodeficiency
 - Mutations in CD154 gene
 - Defected IgM cannot mount immune response



allerresponz.com



Laboratory Diagnosis

- ▣ Specimen Source
 - Multiple Stool Specimens
- ▣ Diagnostic Techniques
 - Wet Mount
 - Modified Acid Fast Stain
 - Direct Fluorescent Antibody (DFA) Assay
- ▣ Detection Methods
 - Safranin Stain
 - Trichrome Stain
 - Enzyme Immunoassay (EIA)
 - Polymerase Chain Reaction (PCR)
 - Rapid Immunochromatographic cartridge Assays



savethecanyoncall.com



Post Mortem Lesions

● Gross lesions

(not common)

- Hyperemia of intestinal mucosa The mucosal folds are markedly thickened, and there are numerous pinpoint foci of hyperemia.

● Microscopic lesions

- Mild to severe villous atrophy
- Spherical organisms in the brush border



Wet Mount

- ▣ Visualization of Oocysts
 - 4 to 6 μm
- ▣ Bright-Field Microscopy
- ▣ Differential Interference contrast (DIC)
- ▣ High Sensitivity and Specificity



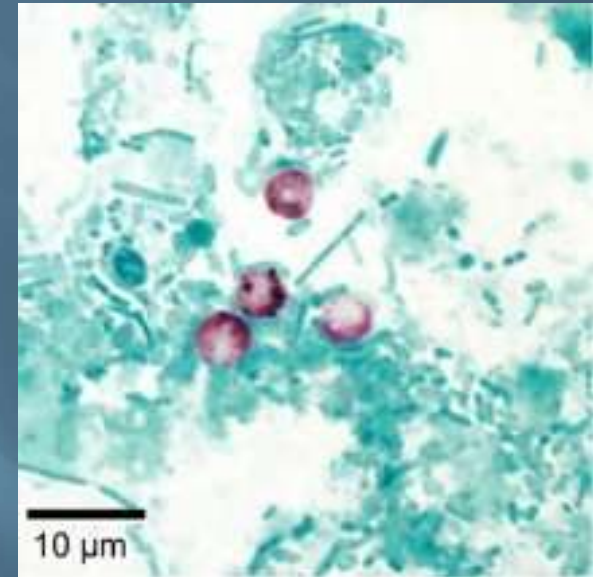
CDC DPDx Library

Wet Mount Slide



Modified Acid-Fast Stain

- ▣ Visualization of Oocytes
 - Light pink to dark red
 - Can also visualize sporozoites
- ▣ Relatively High Sensitivity and Specificity
- ▣ Irregular Staining
 - cause “ghost” oocysts



CDC DPDx Library

Modified Acid Fast Stain



Direct Fluorescent Antibody (DFA) Assay

- ▣ Fluorescence microscope
- ▣ “Gold Standard”
 - High sensitivity and specificity
- ▣ Does not provide achievable stained slide
- ▣ Requires special equipment



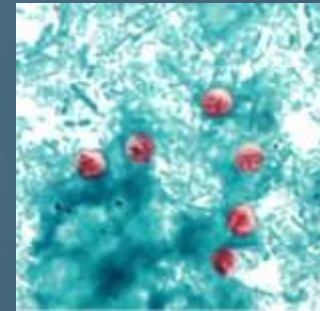
CDC DPDx Library

Fluorescent Stain
Auramine Rhodamine



Safranin and Trichrome Stains

- ▣ Safranin stain
 - Oocysts stain a bright red orange
 - Not widely used because oocysts may not stain properly
- ▣ Trichrome Stain
 - Oocysts may appear unstained
- ▣ Lowest sensitivity and specificity among all tests
- ▣ Can detect Oocysts, but *Cryptosporidium* should be confirmed by diagnostic techniques



CDC DPDx Library
Safranin Stain



CDC DPDx Library
Trichrome Stain



Enzyme Immunoassay (EIA)

- ▣ Detects isolated antigens from a patient's sample using antibodies that are tagged with a color-changing enzyme.
- ▣ Relatively high Sensitivity and Specificity
- ▣ Does not involve microscopy
- ▣ Screens large numbers of specimens



techlab.com



Polymerase Chain Reaction

- ▣ Separates DNA fragments based on size
- ▣ 435 bp
- ▣ High Sensitivity and Specificity



CDC DPDx Library



Rapid Immunochromatographic Cartridge Assays

- ▣ Detects isolated antigens from sample using antibodies. A positive test is indicated by a colored bar.
- ▣ Variable Sensitivity and Specificity
- ▣ Some Assays Have Been Recalled



alibaba.com



Treatment

- ▣ Nitazoxanide
- ▣ Paromomycin
- ▣ Azithroycin
- ▣ Individuals with AIDS
 - anti-retroviral therapy

