

# Lecture : *Cryptosporidium parvum*

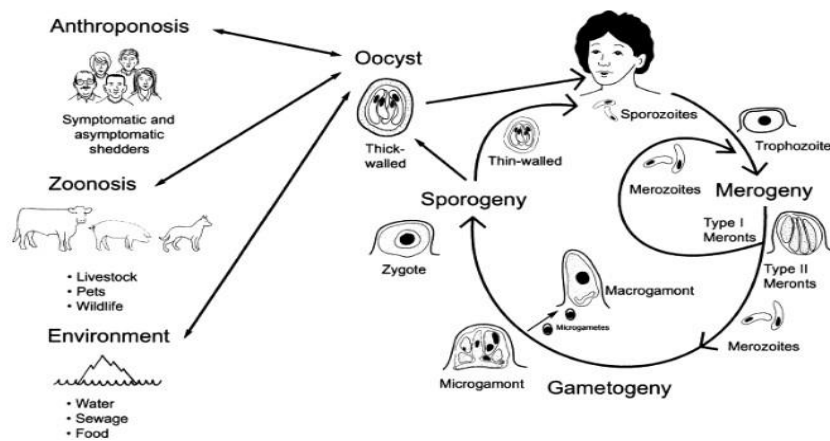
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- **Introduction** *Cryptosporidium parvum* is a minute coccidian parasite with a global distribution. It is a significant pathogen, particularly in immunocompromised individuals, where it can cause severe diarrhea and other complications. The parasite was first observed in the gastric mucosa of laboratory mice. Then they found the first human case reported after 6 years
- **Epidemiology**
  - **Distribution:** Worldwide.
  - **Primary species affecting humans:** *Cryptosporidium hominis* and *Cryptosporidium parvum*.
  - **At-risk populations:**
    1. Immunocompromised individuals (e.g., AIDS patients with CD4+ T-cell counts < 100/μL).
    2. Young children, particularly in tropical areas and daycare centers.
    3. Animal handlers and those exposed to contaminated water or food.
    4. Travelers experiencing traveler's diarrhea.
- **Habitat** *C. parvum* primarily inhabits the small intestine but can also be found in the stomach, appendix, colon, rectum, and pulmonary tree.
- **Morphology**
  1. **Oocyst:**
    - Size: 4–6 μm.
    - Contains four crescent-shaped sporozoites.
    - Features a thick, durable wall; thin-walled oocysts (20%) enable autoinfection.
    - Resistant to most disinfectants and temperatures up to 60°C.
  2. **Schizonts and Gametocytes:**
    - Schizonts contain 4–8 merozoites.
    - Microgametocytes and macrogametocytes lead to zygote and oocyst formation.

## Life Cycle

- **Type:** Monoxenous (completed in a single host).
- **Hosts:** Humans, cattle, cats, and dogs.
- **Infective Form:** **Sporulated oocyst** containing four sporozoites.
- **Transmission:**
  - Ingestion of contaminated food or water.
  - Direct contact with infected animals or contaminated environments.
  - Autoinfection by thin-walled oocysts.
- **Stages:**
  1. Ingestion of oocysts.
  2. Sporozoite release and epithelial cell infection.
  3. Asexual multiplication (schizogony): Formation of merozoites and type I and II meronts.
  4. Sexual reproduction (gametogony): Formation of zygotes and sporulated oocysts.
  5. Excretion of thick-walled oocysts in feces (external transmission) and thin-walled oocysts (autoinfection).



**Figure (1)** life cycle

## Pathogenesis and Clinical Features

- **Incubation Period:** 2–14 days.
- **In Healthy Individuals:**
  - Often asymptomatic or mild, self-limiting illness.
  - Symptoms: Watery diarrhea, abdominal pain, fever, nausea, and weight loss.
- **In Immunocompromised Individuals:**
  - Chronic, profuse diarrhea (up to 25 L/day).
  - Severe fluid and electrolyte depletion, weight loss, and emaciation.
  - Extraintestinal manifestations: Sclerosing cholangitis, cholecystitis, and respiratory involvement.

## Laboratory Diagnosis

### 1. Stool Examination:

- Direct wet mounts reveal colorless, spherical oocysts (4–5  $\mu\text{m}$ ).
- Staining Techniques:
  - ✓ Modified acid-fast stain: Oocysts appear as red spheres against a blue background.
  - ✓ Cold Ziehl-Neelsen stain.

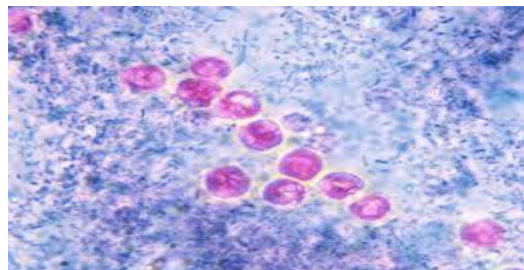


figure (2) Modified acid-fast stain: Oocysts

- Concentration Techniques:
  - ✓ Sheather's sugar flotation.
  - ✓ Zinc sulfate flotation.

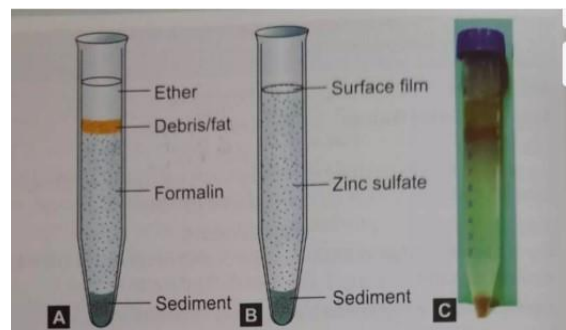


Figure (3) flotation technique

2. **Serodiagnosis:**
    - ELISA for *Cryptosporidium* antigens in stool.
    - Indirect immunofluorescence and western blot techniques for antibody detection.
  3. **Molecular Methods:** by PCR for detecting viable oocysts.
  4. **Histopathology:**
    - Biopsy of small bowel epithelium (jejunum preferred).
    - Light and electron microscopy identify parasite at the apical epithelial surface.
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## **Prevention and Control**

1. Proper water treatment: Sequential application of ozone and chlorine.
2. Hygiene Measures:
  - Handwashing with disinfectants.
  - Using gloves when handling infected materials.
3. Disinfection:
  - Use of full-strength commercial bleach or 5–10% ammonia.
4. Enteric precautions for infected individuals.