

# Cryptosporidiosis

## WHAT IS CRYPTOSPORIDIOSIS?

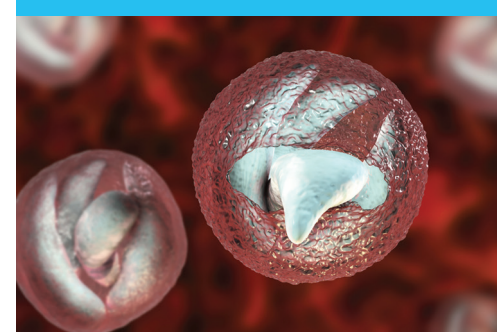
*Cryptosporidium* infection (cryptosporidiosis) is a diarrheal disease caused by tiny, one-celled *Cryptosporidium* parasites representing at least 15 genotypically and phenotypically diverse species. When these parasites enter the body, they travel to the distal small intestine and burrow into the intestinal walls. After 1-2 weeks, they are shed and excreted in feces. Infection can also occur in the respiratory tract.

## SYMPTOMS AND COMPLICATIONS

Clinical symptoms mainly include watery diarrhea, followed by abdominal pain and fatigue. Infected individuals may also experience nausea, fever, vomiting, headache and eye pain.<sup>1</sup> Although both immunocompetent and immunocompromised individuals can be affected, symptoms for the latter are particularly severe and can be fatal.<sup>2</sup> In fact, *Cryptosporidium* is commonly isolated from HIV-positive patients presenting with diarrhea.

## TRANSMISSION

Cryptosporidiosis is transmitted across humans (mostly children) and animals via the fecal-oral route, primarily through contaminated material such as dirt, water, food and close contact with fecal matter from an infected individual or animal. It has become the most frequently recognized cause of gastroenteritis associated with recreational water such as public pools, especially in disinfected venues due to its resistance to chlorination and other methods of disinfection. Infection occurs by ingestion of the oocysts, which are activated in the gastrointestinal tract and release 4 infective sporozoites. These bind to the surface of the intestinal epithelial cells, causing diarrhea.<sup>3</sup>



One-celled *Cryptosporidium* parasites represent

**≥15**

genotypically and phenotypically diverse species

### Symptoms of *Cryptosporidium*

- Watery diarrhea
- Abdominal pain
- Fatigue
- Nausea
- Fever
- Vomiting
- Headache
- Eye pain

Data current as of February 26, 2020

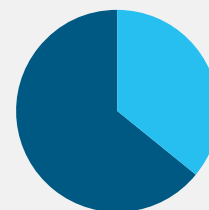
## DIAGNOSIS AND TREATMENT

Cryptosporidiosis is difficult to diagnose via standard methods and usually requires a workup. Although there are various approaches used to diagnose cryptosporidiosis, many laboratories do not test for *Cryptosporidium*, and existing tests are largely insensitive. Traditional approaches include microscopy and serologic antibody tests (e.g., ELISA), but the use of multiplexed PCR tests have increased the sensitivity and specificity. Other approaches include liver function tests, ultrasound, biopsy and histologic examination of the small intestinal epithelium. Treatment includes fluid rehydration, electrolyte replacement and antimotility agents such as loperamide. While nitazoxanide is the only antiparasitic drug with proven efficacy for treating cryptosporidiosis in immunocompetent individuals, immunocompromised individuals such as patients with HIV/AIDS are usually also administered a protease inhibitor to improve immune status.<sup>4</sup>

## CURRENT SITUATION, EPIDEMIOLOGY AND WHAT'S NEXT

The frequency of cryptosporidiosis has not been well-defined in the US. From 2006-2010, the prevalence was 2.3-3.9 cases per 100,000, with 13,453 cases reported in 2016. However, some estimates suggest that these figures could be 100-fold higher.<sup>5</sup> Seroprevalence studies indicate that 35-36% of the population in developed countries have had cryptosporidiosis at some point in their lifetime. In a large multicenter study of moderate to severe diarrhea in sub-Saharan Africa and Southern Asia, *Cryptosporidium* was second only to rotavirus as the cause of diarrhea in children <2 years old and was associated with 200,000 deaths.<sup>6</sup> In many developing countries, cryptosporidiosis affects 12-18% of individuals with AIDS who have diarrhea. Other studies have observed *Cryptosporidium* in 6% of Americans traveling to Mexico, which might explain the incidence of traveler's diarrhea in this area.

While the number of drugs and vaccines for cryptosporidiosis are few and far between, there are a number of ongoing research projects by organizations such as the World Health Organization and International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) to promote initiatives across R&D and general health and nutrition for individuals living in at-risk environments and regions. However, a better understanding of the organisms themselves is likely to spur new drug and vaccine development in the near future.



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1 Adler, S. et al. *Parasitology Research*, 116, 2017, 2613-2618

2 "Cryptosporidium Infection," Mayo Clinic website

3 Tanabe, M. et al. "Cryptosporidiosis," November, 2019, Medscape website

4 Ali, S. et al. *J Pak Med Assoc*, 64(6): 613-618

5 Painter, J. et al. *Epidemiol Infect.*, 2016, 144(8): 1792-1802

6 Sow, S. et al. *PLoS Negl Trop Dis.*, 2016, 10(5): e0004729

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