



# Treating Cryptosporidium with Immunoglobulin, an

## Alternative Approach

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### Introduction

- Infection with the intracellular parasite *Cryptosporidium* causes self-limited diarrhea in immunocompetent hosts, but severe diarrhea resulting in weight loss and malabsorption in immunocompromised hosts
- Transmission occurs via infected person or animal, or from fecally contaminated food or water
- Causes secretory diarrhea associated with malabsorption
- Although it is typically treated with antibiotics and antiparasitics, a novel approach with oral immunoglobulin can be utilized

### Case Description

- A 72-year-old man with a history of diffuse large B-cell lymphoma s/p recent BEAM chemotherapy was admitted for autologous stem cell transplant
- He developed neutropenic fever on HD4, started on meropenem and vancomycin, then changed to cefepime
  - Blood cultures grew *Escherichia coli* 4/4 bottles
- On HD 10, he developed persistent, non-bloody diarrhea with liquid stools and abdominal pain
  - Then had a hypotensive episode while going to the bathroom, systolic BP to 80-90s
  - Prompted transfer to the MICU...

**Vitals:** BP 101/53, HR 110, T 36.4, RR 18, PO2 100% on RA

**Exam:** well-appearing male in mild distress, severe abdominal distention with moderate tenderness to palpation b/l lower quadrants

#### Labs:

24.8	137	114	78	102
0.78	3.7	11	2.6	
8.4				

AST 24	Phos 5.6
ALT 30	T protein 4.6
T bdi 2.7	Lactate 0.9
ALP 54	Alb 1.5
Mg 2.8	

- UA: 8 RBC, 8 WBC, 22 granular casts
- Blood culture x2 negative

#### Imaging:

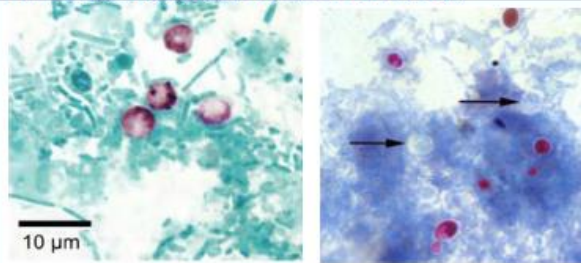
- Abdominal X-ray: consistent with ileus or low grade obstruction
- CT abdomen-pelvis: diffuse ileal and right colon bowel wall thickening and edema, with fat stranding around ascending colon

### ICU Course

- Given fluids and vasopressors once in the MICU, after which his vitals stabilized
- Metronidazole added for anaerobic coverage, but he continued to have non-bloody diarrhea on metronidazole and cefepime
  - Was then changed back to just meropenem (ultimately completed 14 day course)
- Tests for *Clostridium difficile*, GI pathogen panel, and ova and parasites were all negative
- Stool *Cryptosporidium* immunoassay testing was positive!**
  - Nitazoxanide was started
  - It was later discovered that the patient had been drinking well water near his cabin for the past few months
- He then developed an ileus, and a nasogastric tube was placed
  - Oral nitazoxanide was temporarily held secondary to absorption concerns
  - Oral immunoglobulin was started**
- The patient completed 48 hours of oral immunoglobulin, the ileus resolved, and nitazoxanide was restarted
  - He improved clinically with this therapy and diarrhea resolved
- Six days later, the patient contracted a respiratory *Aspergillus* infection and died shortly thereafter

### Modified acid-fast stain

*Cryptosporidium* oocysts often range from 4-6 um, have distinct oocyst walls, and typically stain from pink to bright red, as seen on the left. However, resolving infections can have colorless oocyst "ghosts," seen on the right (4).



### CT abdomen-pelvis

This image demonstrates the ileal and ascending colon bowel wall thickening (arrow) and fat stranding (arrowheads), which is typically seen in *Cryptosporidium* enteritis. This infection can involve the small bowel, large bowel, or even the biliary tract!

### Discussion

- This case demonstrates a typical transmission route for *Cryptosporidium*...
  - Fecally-contaminated well water!
  - Cryptosporidium* oocysts are present in 67 to 95% of raw surface waters
  - This patient's exposure to the well water near his cabin was most likely the infectious source (1)
- In immunocompromised patients, *Cryptosporidium* is treated with nitazoxanide for at least two weeks, adding an antibiotic such as azithromycin if initial treatment fails
  - Data on treatment in immunocompromised patients is largely from HIV-positive patients, with much less from HIV-negative patients (as was this patient)
  - A study of immunocompromised HIV-negative patients showed a 61% cure rate with nitazoxanide alone vs. a 95% cure rate with nitazoxanide combined with antibiotics (2)
  - Thus, nitazoxanide combined with antibiotics can be an effective therapy!
- Our patient's ileus decreased the efficacy of oral nitazoxanide
  - Prolonged ileus causes edematous sequestration of the gut walls, impairing drug diffusion and thus drug absorption
  - Oral immunoglobulin acts on microbes within the gastrointestinal tract itself, so an ileus does not affect its drug absorption
  - The powder form of immunoglobulin has demonstrated treatment promise in HIV-positive patients (3)
  - If a patient is not recovering with nitazoxanide +/- antibiotic therapy, oral immunoglobulin can be considered

### Teaching Points

- This case demonstrates a classic source for a *Cryptosporidium* infection, via well water
- Nitazoxanide combined with antibiotics is an effective therapy for immunocompromised patients infected with *Cryptosporidium*
- Consider oral immunoglobulin if the patient is not recovering with nitazoxanide +/- antibiotics

### References

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- Greenberg PD, Cello JP. Treatment of severe diarrhea caused by *Cryptosporidium parvum* with oral bovine immunoglobulin concentrate in patients with AIDS. *J Acquir Immune Defic Syndr Hum Retroviral*. 1996;13(4):248-254.
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