



**Dreamfields Pasta--
A Healthy Meal Addition for Clostridium difficile:
A reoccurring problem in hospitals and nursing
homes.**



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Clostridium difficile is an opportunistic bacterial pathogen commonly found in the intestinal tract in low numbers. It can be found as part of the normal flora in as many as 50% of children under age two, and less frequently in individuals over two years of age. The organism is now recognized as the major cause of a certain type of intestinal inflammation called *pseudomembranous colitis* and its associated diarrhea. *C. difficile* infection represents one of the most common institutional infections around the world. In the United States alone, *C. difficile* causes approximately three million cases of colitis and diarrhea per year⁹. This bacterium is primarily acquired in hospitals and chronic care facilities following overuse of antibiotic therapy covering a wide variety of bacteria (broad spectrum-types, such as penicillin (ampicillin), amoxicillin, clindamycin and cephalosporins) and is the most frequent cause of outbreaks of diarrhea in hospitalized patients. One of the main characteristics of *C. difficile*-associated colitis is severe inflammation in the colonic tissue (mucosa) associated with destruction of cells of the colon (colonocytes). Pseudomembranous colitis represents the characteristic sign of full-blown *C. difficile*-associated colitis. Tests reveal the presence of characteristic plaque-like pseudomembranes, scattered over the colonic tissue. The presence of these plaques is a distinctive indicator of *C. difficile* infection in patients with diarrhea following antibiotic treatment⁹.

The *C. difficile*-associated disease initially occurs when normal intestinal bacteria are altered following broad spectrum antibiotic therapy. In hospitals or nursing home facilities where *C. difficile* is prevalent and patients routinely receive antibiotics, *C. difficile* infection is very common. As such, the organism contributes significantly to hospital length of stay and rising health care costs, and may be associated in some elderly individuals with chronic diarrhea, and occasionally other serious or potentially life-threatening consequences. By contrast, individuals treated with antibiotics as outpatients have relatively low risk of developing infection. Studies have shown that when *C. difficile* colonize the gut and flourish, they release two potent toxins, toxin A and toxin B, which bind to certain receptors in the lining of the colon and ultimately causes inflammation and watery diarrhea⁹. The primary diagnosis of *C. difficile* infection is related to demonstration if these two toxins in the stool of suspected patients.

The bacterium is typically spread via spores being shed into the stool that become spread from person to person. These spores can survive up to 70 days in the environment and can be transported on the hands of health care personnel who have direct contact with infected patients or with environmental surfaces (floors, bedpans, toilets, etc.) contaminated with *C. difficile*⁹.

Therapy of infection is typically directed against eradication of the microorganism from the colonic microflora. No therapy is required for asymptomatic carriers. In noncomplicated patients with mild diarrhea, no fever, and modest lower abdominal pain, discontinuing antibiotics (if possible) is often sufficient to stop symptoms and diarrhea. When severe diarrhea is present and in cases of established colitis, patients should receive specific antibiotics for *C. difficile*, namely Flagyl (metronidazole) and Vancocin (vancomycin). Metronidazole is typically the first used, but if this does not effectively or the *C. difficile* comes back then Vancocin is used. The key problem with the use of these antibiotics is that metronidazole kills off many of the good bacteria, those required to compete with *C. difficile*, while most strains of Lactobacilli are resistant to Vancomycin. This fact provides a means of also consuming probiotics containing Lactobacilli to help increase the intestinal microflora balance while taking the more specific antibiotic. Furthermore, doctors do not wish to over prescribe vancomycin because it is very expensive and also there is concern about it creating resistant bacteria strains--including *C. difficile*. Studies have recently indicated that 25% or more of *C. difficile* strains are now resistant to vancomycin.

Relapsing *C. difficile* infection continues to be a challenge. A subset of patients with *C. difficile* infections continue to relapse whenever antibiotics are discontinued. Some health care authorities recommend switching to using alternative therapies to reduce potential issues of antibiotic overuse and provide a means to help treat and provide a more effective prevention mechanism. Recent research has shown that using Inulin, a selective prebiotic fiber source found in Dreamfields pasta, helps maintain healthy levels of health-promoting intestinal microflora, like bifidobacteria and lactobacilli, thus minimizing the potential for *C. difficile* overgrowth to provide a treatment for the disease and its inflammation^{2,3,15}. As inulin is the selective food source for these probiotic or “good” bacteria, they can be administered with inulin to help compete against *C. difficile* and other pathogens to minimize their overgrowth and potential for infection^{1,2,3,4,5,6,7,8,10,11,12,13,14,15,16,17}. Research further shows that inulin helps normalize *C. difficile* metabolism after the organism becomes established and infection occurs¹⁵. *C. difficile* decreases good fermentation and the production of health-promoting short chain fatty acid (SCFA). Through the consumption of inulin, the metabolic activity of the organism is normalized resulting in suppressed proteolysis (bad fermentation), to decrease the production of toxic metabolites. Ammonia production—a known liver toxin—is almost completely suppressed with inulin consumption in the presence of *C. difficile* infection. Iso-SCFA formation from amino acids (*i*-butyrate, *i*-valerate), and the formation of phenolic compounds (indole, phenol, *p*-cresol, skatol) almost entirely eliminated. Inulin consumption, while suppressing the bad fermentation, further increases (good fermentation) and the production of health-promoting SCFA production (acetate, propionate, butyrate), and lactate.

Recent research results clearly indicate the potential of inulin to shift the metabolic activity of the human colonic microflora into a direction that results in production of potentially less toxic metabolites, both under normal conditions and under conditions with disturbed intestinal microflora¹⁵.

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