

FROM THE LAB



Why is C. diff so hard to culture and kill?

Clostridium difficile, commonly referred to as C. diff, is the #1 nosocomial infection in hospitals (it actually kicked staph infections out of the top spot). At Assurance, we test for this organism as part of our Gastrointestinal (GI) panel.

C. diff is a gram-positive anaerobe, meaning it does not like oxygen. Its defensive mechanism is sporulation – where it essentially surrounds itself with a tough outer layer of keratin and can live in water, soil, etc. for over a decade. For reference, anthrax is another organism that sporulates. Once C. diff sporulates, it is very hard to kill and in fact, bleach is one of the only disinfectants that work. Unfortunately, it can spread quickly throughout hospitals. Spores of C. diff are found all over hospital surfaces and even in some hospital water systems. It's the most threatening for those who are immunocompromised or the elderly, who are the most likely to end up with C. diff infections.

With our PCR testing, we're looking for the C. diff organism itself but we're also looking at the production of toxin. Unless it produces toxins A AND B together OR toxin B, C. diff doesn't cause severe disease. Many babies are exposed to it during birth or in the hospitals and may test positive on our GI panel. Unless they are expressing those toxins (both toxin A&B or just toxin B) it is not considered a clinical infection.

Studies show that toxins A&B together causes infection, as well as toxin B. Although there are conflicting studies, toxin A may also cause infection. Unless the organism is producing these toxins, it's not considered an active infection. So, if we have a patient sample that tests positive for C. diff, we will not culture unless it's positive for either or both toxins.

Most individuals are exposed to C. diff and we can live with it in our gut without issue. The majority of the time, it lies dormant and our normal gut flora keeps it in check so it doesn't cause infection. Overuse of antibiotics can lead to C. diff infections since many antibiotics wipe out normal gut flora and, in turn, allows C. diff to proliferate.

When C. diff is in a vegetative state, it can easily die when exposed to oxygen, making it incredibly difficult to culture. All specimens that test positive for C. diff by PCR are subsequently cultured in our lab anaerobically, meaning in the absence of oxygen. However, due to the finicky nature of the pathogen in its vegetative state, culture isn't always successful.

Unfortunately, very few treatments are available to treat C. diff, such as:

1. Metronidazole
2. Vancomycin
3. Fidaxomicin

Although it seems almost illogical to use antibiotics to treat an infection caused by overuse of antibiotics, this has been the most widely accepted treatment option. Unfortunately, 20% of people treated with antibiotics will get sick again. Fecal transplants have been successful in treating C. diff and have been in use for the last 5-6 years. This process



removes feces from a healthy donor (usually a family member who has been screened for C. diff) and transplants it into the patient who has C. diff in an attempt to get the gut flora back to normal. Some studies show a success rate greater than 85%.

Due to the serious nature of this type of infection, our lab has a process in place to alert the physician immediately if a patient's or resident's sample tests positive for any of the C. diff toxins.

If you have any questions about C. diff or our testing, please contact us at ClientServices@AssuranceScientific.com or call 1.855.319.4459.

