

# Single fungus amplifies Crohn's disease symptoms

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A microscopic fungus called *Candida tropicalis* triggered gut inflammation and exacerbated symptoms of Crohn's disease, in a recent study conducted at Case Western Reserve University School of Medicine.

The study was presented at the Digestive Disease Week May 5-9, 2017 at McCormick Place in Chicago, Illinois.

Colon [inflammation](#), or colitis, is a painful yet common symptom in Crohn's disease. Scientists believe colitis is caused by an abnormal immune response during which the body tries to fight an infection, but also attacks the intestinal tract. According to the new study, *C. tropicalis* infection may intensify this malfunction.

Said Luca Di Martino, Ph.D., Postdoctoral Research Fellow in the Digestive Health Research Institute at Case Western Reserve University School of Medicine, "The type of microorganisms that live in our intestine, our microbiome, has been shown to be a key element for triggering Crohn's disease. Recent studies have shown that the abundance of the fungus *Candida tropicalis* is significantly higher in the intestine of Crohn's disease patients compared to healthy people." Di Martino investigated how *C. tropicalis* and other gut microorganisms may influence intestinal inflammation.

Researchers induced colitis symptoms in [mice](#) by adding low levels of dextran sodium sulfate to mice drinking water. The chemical causes

acute intestinal injury, similar to a colitis flare. Next, they infected a subset of the mice with *C. tropicalis* fungi and examined the mouse intestinal tracts and gut bacteria.

Researchers discovered mice infected with *C. tropicalis* fungi had intensified Crohn's disease symptoms, compared to uninfected mice. The findings suggest anti-fungal medications could combat debilitating symptoms of the disease by lowering gut levels of *C. tropicalis*.

"Our data demonstrate that *C. tropicalis* may play a pro-inflammatory role in intestinal injury by exacerbating gut inflammation during the recovery phase of dextran sodium sulfate-induced colitis," the authors wrote. "We speculate that infection with the fungus *C. tropicalis* may play a role in triggering flares during Crohn's disease and that anti-fungal therapy may be beneficial in Crohn's disease patients."

The researchers suggest *C. tropicalis* fungus may trigger gut inflammation by modulating levels of other gut bacteria. Said Di Martino, "We found that high levels of *C. Tropicalis* increases the abundance of harmful proteobacteria in the intestine, such as *E. coli*, disrupting the normal balance of the gut bacteria and creating a dysbiosis, a key element that triggers intestinal inflammation."

Infected mice had several signs of debilitating [gut inflammation](#). Endoscopies revealed colons from infected mice had 4.5 times higher levels of particular inflammatory molecules (called IFN- $\gamma$ ) associated with colitis. Under the microscope, infected intestinal tracts also had more severe visual signs of swelling than those from uninfected mice.

"We discovered that experimental mice infected with *C. tropicalis* were more susceptible to intestinal inflammation compared to uninfected mice," Di Martino said.

"The most exciting discovery was that in the infected mice there was a significantly higher abundance of proteobacteria, the same type of deleterious bacteria found increased in Crohn's patients," Di Martino said. "This confirmed that the presence and the abundance of fungi in the intestine have the ability to modify the bacteria living in our intestine, leading to a dysbiosis which will eventually trigger an inflammatory syndrome."

"As a next step, we want to confirm the role of the fungi in the pathogenesis of Crohn's disease by treating infected mice with antifungal drugs to decrease symptoms of [intestinal inflammation](#)," Di Martino said. "If our hypothesis is right, that would open the door to novel antifungal therapies to treat Crohn's disease patients."

This study tested the effects of human [gut bacteria](#) in an animal model, and results may not fully translate to human disease. The researchers also induced colitis in mice acutely using dextran sodium sulfate, while colitis is often a chronic condition in humans.

Provided by Case Western Reserve University

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