Study hints at probiotics as treatment for Clostridium difficile

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Asymptomatic colonization by Clostridium difficile, absent the use of antibiotics, is common in infants and when it happens changes occur in the composition of the gut microbiota according to research published in the March 2011 issue of the *Journal of Clinical Microbiology*.

The adult human gut is an ecosystem containing several pounds of bacteria, including hundreds of species and more than 100 trillion (100,000,000,000,000) individuals. A healthy microbial ecosystem protects the host against Clostridium difficile, which frequently colonizes the gut after its ecological balance has been disrupted by broad spectrum antibiotics, says Anne Collignon, of the University Paris Sud, Chatenay-Malabry, France.

Collignon and her colleagues examined the bacterial populations from fecal samples taken from 53 infants, 27 of them negative and 26 positive for C. difficile. Using a variety of analytic methods, her team showed that the C. difficile-negative infants' GI tracts contained the species, Bifidobacterium longum, which was absent from the C. difficile-positive infants, while the latter contained other species not present in the non-colonized guts, including Klebsiella pneumoniae. "We believe that this colonization is linked to an encounter with C. difficile spores, which are frequent in the environment, and a permissive microbiota," says Collignon.

"To reconstitute the ecological balance of the microbiota, and with that, the "barrier" effect, seems a very efficient way to combat C. difficile

infections," says Collignon. "Our results suggest that Bifidobacterium species, which are used as probiotics, can participate in that barrier effect against C. difficile. But proof is necessary, for example, in gnotoxenic animal models (germ-free animals challenged with specific bacteria)." But she notes that another team of investigators has shown similar results in elderly people. "It is well known that following use of broad-spectrum antibiotics, the gram positive species decrease dramatically, and the bacteroides increase," she says. "Our study gives some clues to the microbiota composition allowing C. difficile colonization," she concludes in the paper.

Clostridium difficile is the most common cause of antibiotic-associated diarrhea and pseudomembranous colitis in adults, and infections are on the rise. Morbidity and mortality are high, and patients who are treated frequently relapse, as spores persist in the gut. Reconstituting the microbial ecology, with its barrier effect "seems a very efficient way to combat C. difficile infections," says Collignon, and recent studies suggest that this can be accomplished with probiotics and fecal transplantation.

More information: C. Rousseau, et al. 2011. Clostridium difficile colonization in early infancy is accompanied by changes in intestinal microbiota composition. *J. Clin. Microbiol.* 49:858-865.

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