Researchers focus on menacing 'superbug,' hoping to identify what makes patients susceptible
2 December 2021, by Shana Hutchins

Prior studies have shown C. difficile infection to be strongly correlated with a high abundance of secondary bile acids that are toxic to C. difficile in laboratory settings. These small molecules are generated by a healthy gut microbiome from primary bile acids that are synthesized in the liver.

Texas A&M biologist and 2020 Chancellor's EDGES Fellow Joseph Sorg says scientists have long viewed these small molecules as a key protector in preventing C. difficile infection. The research was first featured by Sorg Laboratory graduate student Andrea Martinez Aguirre in a paper published earlier this fall in the journal PLOS Pathogens with help from Tor Savidge's group at Baylor College of Medicine.

"Many ongoing efforts are developing probiotic treatment options for C. diff-infected patients—efforts that focus on restoring secondary bile acids to patients," Sorg said. "Our findings show that these treatments should instead focus on microbes that consume nutrients important for C. diff growth and that secondary bile acids are a red herring for protection."

As the basis of their study, the team used mice derived germ-free at Baylor College of Medicine that were colonized with a single species of bacteria known to be involved in secondary bile acid generation and strongly correlated with a protective C. difficile environment. As an additional control measure, they selected a mutant mouse strain purchased through the NIH's Knockout Mouse Project that was bred at Texas A&M and distinct for its inability to synthesize a major class of bile acids, thereby further limiting the secondary bile acid pool.

"Surprisingly, we found that mice colonized with these microbes (C. scindens, C. hiranonis, or C.
leptum) protected against C. diff disease but did not produce secondary bile acids," Sorg said.

Sorg joined the Texas A&M Department of Biology in 2010 and has been working since his postdoctoral days to unlock C. difficile's basic science, from its physiology to its virulence. He earned his doctorate in microbiology at the University of Chicago in 2006, the same year the C. difficile genome was sequenced, and since has emerged as one of the pioneers of C. difficile study.


Provided by Texas A&M University

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