



TECHNOLOGY

Clostridium difficile Type IV Pilin As New Target for Vaccine, Therapeutics and Diagnostics

OVERVIEW

Type IV pilin proteins are extracellular and easily accessible to the host immune system, as well as being important for initial colonization and biofilm formation. Thus, these proteins present excellent targets for vaccines to prevent pathogen colonization. Neutralizing antibodies directed against pili could lead to immune clearance of *C. difficile* before the organism can establish itself in the colon.

Dr. Donnenberg's group hypothesized that any pilins encoded in the *C. difficile* genome would be immunogenic, as has been shown with pilins from Gram-negative organisms. In their 2014 publication (Maldarelli et al.), the UMB group identified nine pilin or pilin-like protein genes in *C. difficile*, for which they introduced a coherent nomenclature. Six of the nine identified proteins were purified and used to immunize mice. Immunization of mice with each individual protein generated antibody responses that varied in titer and cross-reactivity. These results illuminate components of the *C. difficile* type IV pilus and help identify targets for an anti-*C. difficile* vaccine. Future work is underway to confirm the major pilus subunit, the functional roles of the other pilins and pilin-like proteins and to test the protection afforded by a pilin-based vaccine against *C. difficile* infection in animal models.

APPLICATIONS

Clostridium difficile is now the leading cause of human health care associated diarrhea. Infection with the bacterium has a variety of manifestations, ranging from asymptomatic colonization of the colon to copious diarrhea, pseudomembranous colitis, and death. While antimicrobial therapy for infection is available, treatment often fails and relapse is common.

ADVANTAGES

The Type IV pilin identified in *C. difficile* by Dr. Donnenberg's group is the basis of new vaccine development against this increasingly prevalent disease-causing organism. Type IV pilin also promises to be a useful target for development of new therapeutics and diagnostics for *C. difficile*.

STAGE OF DEVELOPMENT

Future work is underway to confirm the functional roles of the pilins and pilin-like proteins and to test the protection afforded by a pilin-based vaccine against *C. difficile* infection in animal models. This approach is expected to lead to clinical studies.

R&D REQUIRED

Further pre-clinical research is underway to validate new vaccine approach.

LICENSING POTENTIAL

UMB seeks development partners for licensing, collaboration, and/or sponsored research.

CONTACT INFO

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Additional Information

INSTITUTION

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PATENT STATUS

U.S. Patent 8,518,145 issued 08/27/2013. US Patent CIP 9,802,988 issued 10/31/2017

LICENSE STATUS

Available for licensing

CATEGORIES

- Diagnostics
- Therapeutics
- Vaccines

INVESTIGATOR(S)

Michael Donnenberg

EXTERNAL RESOURCES

- [Identification, immunogenicity, and cross-reactivity of type IV pilin and pilin-like proteins from Clostridium difficile](#)

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