Jill Steinbach—Rankins

Bacterial vaginosis (BV) is a prominent dysbiotic condition, resulting from the disruption of the diverse microbial communities that maintain host homeostasis and innate defense in the female reproductive tract. BV infection and recurrence affects over 30% of women, imparting detrimental effects to female reproductive health, by increasing the susceptibility to adverse pregnancy outcomes, postsurgical infections, and sexually transmitted infections (STIs). Current treatment options, primarily comprised of orally- or topically-applied antibiotics, are initially efficacious; however, frequent relapse is prevalent, contributing to recurrent BV infections and adverse side effects. New therapeutic options, including prebiotics (e.g. lactic acid, glycogen) and probiotics have been utilized to recruit and stabilize indigenous "normal" *Lactobacilli* to counterbalance the predominant BV-associated bacterial pathogen, *Gardnerella vaginalis (G.v.)*. However, significant gaps remain in our understanding of host-microbiome-therapeutic interactions, contributing to the difficulty in attaining a long-term, effective method of protection and treatment. These widespread, pandemic effects underscore the urgent need to develop more effective BV treatment strategies, and to improve our understanding of host-microbiome-therapeutic interactions that contribute to efficacy.

In this project, we seek to develop new therapies to alter BV pathogenesis, while advancing the understanding of host-microbiome-therapeutic interactions. To achieve these goals, we will optimize the design of a novel delivery platform comprised of core-shell polymeric electrospun fibers (EFs) that deliver pre- and probiotics, test their efficacy *in vitro*, and assess the effectiveness of these fibers in a murine model of BV infection. These studies will provide the foundation for improved therapeutic outcomes, while providing new insight into the effects of combined pre- and probiotic fibers on the vaginal microbiome, host inflammatory response, and BV disease markers and progression. While we will initially apply this delivery approach to target and understand the implications to BV pathogenesis, we envision the research outcomes will have a significant impact on the development of future multipurpose platforms to prevent and treat broader, more complex interactions between bacterial and viral pathogens in the female reproductive tract.