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RESEARCH SPOTLIGHT

OPTIMIZING CO-CULTURE EXPERIMENTS

Meet the Researchers Saying Farewell to Resource-Intensive Validation And Embracing Efficiency in their Co-Culture Experiments

UNIVERSITY OF CAPE TOWN

LOYOLA UNIVERSITY CHICAGO

VEDANTA BIOSCIENCES

> When I first saw the presentation of Cerillo's Co-Culture Duet System, my immediate reaction was, "Well this solves all of my problems!" The Co-Culture System dramatically reduces the time it takes to set up interaction studies and and eliminate variability. A must-have for researchers exploring the microbiome.
>
> **Alan J. Wolfe Ph.D.**
> Department of Microbiology & Immunology
> Loyola University Chicago

01 Discover how Dr. Jo-Ann Passmore and Dr. Brian Kullin and The Mucosal Immunology Group (MIG) at the University of Cape Town, South Africa are using Cerillo's Co-Culture Platform to study bacterial vaginosis to address women's health in Africa.

02 Watch our latest MicrobeMania Podcast where Dr. Alan J. Wolfe from Loyola University Chicago's Department of Microbiology & Immunology discusses groundbreaking research challenging traditional beliefs about the female urinary tract.

03 Learn how Greg Medlock, Director of Research at Vedanta Biosciences is using Cerillo's research platform with Opentron's lab automation system to power discovery of microbiome therapeutics.

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ELEVATING WOMEN'S HEALTH

Tackling the Prevailing Challenge of Bacterial Vaginosis in Africa

The Mucosal Immunology Group at the University of Cape Town is conducting research that focuses on addressing bacterial vaginosis (BV), a persistent challenge for women's health. Their team will use the Cerillo Co-Culture system to isolate and test probiotics that could provide regionally relevant, affordable BV treatments. Their work is a significant step forward in improving women's health, particularly in Africa.

How The Mucosal Immunology Group will use Cerillo's Co-Culture Research Platform

Our research group focuses on the bacteria involved in female genital tract health and disease. This is particularly important in Africa, which has some of the world's highest rates of bacterial vaginosis (BV). BV is a polymicrobial dysbiosis that is associated with increased risk of STI acquisition (including HIV), complications during pregnancy and other negative health outcomes. Unfortunately, current standard of care BV treatment options often only provide temporary resolution and relapse is the case for up to 80% of women. As a research group, we are interested in understanding the interactions between optimal bacteria (Lactobacillus crispatus) and BV-associated bacteria (Gardnerella spp., Prevotella spp., Fannyhessea and others).

Probiotics are a viable, sustainable supplemental treatment for vaginal health. Yet, most commercial products are unaffordable for many African women. Critically, nearly all marketed vaginal probiotics lack vaginal-origin bacterial isolates. Additionally, the few that do often include just a single strain. Growing evidence indicates that consortia of strains, not single isolates, more effectively restore healthy vaginal microbiomes, embodying the idea that the collective is superior to individual components. Geographic specificity in probiotic selection is also essential; strains from a specific region more effectively combat local pathogens. This highlights the importance of developing affordable, geographically appropriate probiotics containing multiple, vagina-derived bacterial strains.

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Jo-Ann Passmore PhD

The Mucosal Immunology Group
University of Cape Town, South Africa

Brian Kullin PhD

In our quest to identify regionally-relevant, affordable probiotic candidates we have identified women in African populations with longitudinally stable, optimal vaginal microbiotas. We have isolated potential probiotic candidates from these women and are trying to understand their interactions with BV-associated bacteria from women in the same populations. Co-culture experiments are a crucial aspect of this and the Cerillo Co-Culture System would allow us to build upon the basic proof of concept experiments we have done thus far (bacterial inhibition soft agar overlay assays, incubation in the presence of spent culture medium, etc).

We propose growing our probiotic candidates in the presence of various African Gardnerella, Prevotella and Fannyhessea spp. isolates in the co-culture system to answer the following questions:

1) What happens in a head-to-head competition assay? – Experiment: Inoculate L. crispatus and Gardnerella/Prevotella/Fannyhessea at the same time in separate wells and examine their respective growth kinetics. Variations – Is the growth outcome different when a consortium of L. crispatus strains is used? If so, what is the optimal consortium? Can we create a L. crispatus consortium that is able to inhibit a consortium of BV-associated strains? Key metrics for all analyses – Growth kinetics

2) Is pre-incubation of the probiotic with the pathogen required for the induction of inhibitory activity? – Experiment: Grow duplicate cultures of L. crispatus to mid-log phase and then inoculate the second co-culture well in each pair with a BV-associated strain ('induced') or sterile media ('uninduced'). Harvest the supernatant from each and use in a spot test for inhibitory activity. Key metrics – inhibition activity (plus some growth kinetics data)

3) What metabolomic changes occur when the probiotic candidates are co-cultured in the presence of BV- associated bacteria? Experiment: Inoculate either individual L. crispatus or strain consortia together with different BV-associated bacteria in the second co-culture well (along with 'uninduced' controls). Compare the expression profiles (rna-seq), proteomes (LC-MS) and metabolomes (LC-MS/MS) of L. crispatus under the two different conditions to identify possible substances responsible for the inhibitory activity.

Results from these experiments will help us to better understand interactions between vaginal bacteria and identify priority candidates for probiotic development.

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WATCH NOW

podcast episode #1

This MicrobeMania Podcast features an Interview with Dr. Alan J. Wolfe from the Department of Microbiology & Immunology at Loyola University Chicago. The Loyola Urinary Education and Research Collaborative (LUEREC), co-directed by Alan J. Wolfe, PhD, is spearheading groundbreaking research that challenges long-held beliefs about the female urinary tract. In 2012, LUEREC provided the first definitive evidence that bacteria colonize the normal female urinary tract, dispelling the age-old notion that urine is sterile. This revelation has opened new avenues for investigating diverse Lower Urinary Tract (LUT) disorders and holds the potential to revolutionize our understanding of urinary health. Visit https://cerillo.bio/microbemania/ for more thought leadership interviews and articles.

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RESEARCH SPOTLIGHT

WATCH NOW

Greg Medlock from Vedanta Biosciences shares how he is using automation to power discovery of microbiome therapeutics.

Vedanta Biosciences is leading the development of a potential new category of oral therapies based on defined consortia of bacteria isolated from the human microbiome and grown from pure clonal cell banks. The company's pipeline includes clinical-stage product candidates being evaluated for the prevention of recurrent C. difficile infection and inflammatory bowel diseases and a preclinical candidate for the prevention of Gram-negative infections. Each product candidate is a defined consortia of bacteria that have been lyophilized and filled in enteric-coated capsules.

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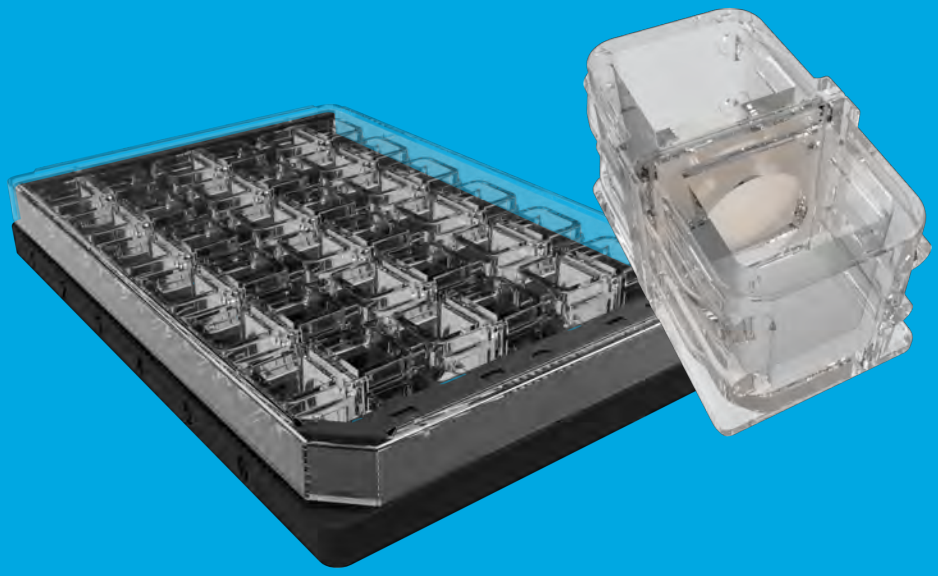
Co-Culture Research Simplified in a Single Plate

The Co-Culture Duet's porous barrier physically isolates populations while maintaining fluidic contact enabling researchers to observe and study individual microbial populations and measure the growth of one microbial population alongside other populations.

- Eliminates resource-intensive setup by providing an off-the-shelf, ready-to-use platform.
- Compatible with other automation systems for freedom and flexibility.
- Scalable, enabling high-throughput experiments for faster results and comprehensive data analysis.
- Standardized method for easier experiment replication and comparison.



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