

**Innovative Prebiotic Mechanisms:
The Science of Bacteriophage**

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Prebiotic Market

As consumers gain recognition of the synergistic value of probiotics and prebiotics, awareness and demand for prebiotics is on the rise.

- The global prebiotics market is predicted to reach \$9.5 billion by 2027 with a 9% CAGR.*
- A third of Americans are trying to consume probiotics.**
- 18% of American are now trying to consume prebiotics.**

* Global Industry Analysts 2020
** International Food Information Council Foundation Food and Health Survey 2019

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The Human Microbiome

100 trillion microorganisms...
10x amount of human cells!

YOU CALL THIS SPONGE?

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The Human Microbiome

- 25 SPECIES in the stomach
- 500-1,000 SPECIES in the intestines
- 600+ SPECIES in the mouth, pharynx and respiratory system
- 1,000 SPECIES in the skin
- 60 SPECIES in the urogenital tract

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A Constant Battle for Food & Space

- LIMITED SPACE
- LIMITED RESOURCES
- GOOD vs BAD

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What is a Prebiotic?

“ non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon, and thus improves host health. ”


- Food and Drug Administration

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Prebiotic Mechanisms


- Enhance or block nutrient uptake
- Enhance or block binding site
- Increase or decrease viability of bacteria
- Provides nutrients for bacteria



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Lesser Known Prebiotics



ALMOND LIPIDS



LACTOFERRIN



PEPTIDES




POLYPHENOLS

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The Human Microbiome



BACTERIA: 100 trillion microorganisms in the body

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10x more bacteria than human cells

↓

BACTERIOPHAGE: 10x more than bacterial cells

↓

100x more bacteriophage than human cells


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Gut Phage Database

Published February 2021

- Created by scientists at the Wellcome Sanger Institute and the EMBL-EBI
- Identifies 142,000 viral species living in the human gut
- Obtained by analyzing 28,060 human gut metagenomes from across the world
- Opens new opportunities for bacteriophages for human nutrition



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Bacteriophage Cocktail

Bacteriophage (phage)

- Sub-microscopic bundles of DNA or RNA surrounded by a protein shell
- Abundant in nature, occurring in seawater, soil, humans and fermented foods
- Existing safety data; history of use as dietary supplement in eastern Europe
- Specific phage classify as prebiotics



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Providing Nutrients for Good Bacteria



cellsave.com

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Safe & Efficacy Analysis: PreforPro®

20+
Safety & Efficacy Tests

<ul style="list-style-type: none"> • Fermentation optimization • pH profile • Temperature profile • Primer design • Whole Genome Sequence • Annotated genome analysis • gyrB Gene sequence analysis • Analysis of 16S rRNA • Phylogenetic Placement using (GGDC) • Genome Allergen Analysis • Genome protein analysis • Probiotic enhancement profile 	<ul style="list-style-type: none"> • Cytotoxicity testing on ATCC CCL-1 • Cytotoxicity testing on CCL-18 cell line • Cytotoxicity testing on ATCC CCL-81 African Green Monkey Vero cell line • Virulence testing for presence of toxins • PCR Toxin screen • Endotoxin test • Boar Sperm Motility Assay • CaCo2 cell adhesion assay • Nutrient analysis • Enumeration optimization • Substrate analysis
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Microbiome Modulation (Clinical 1)

Significant Fold Change in Microbiome with PreforPro®

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Clinical Results - PreforPro (Clinical 2)

Larger increase in *Lactobacillus* and short chain fatty acid-producing microbial taxa

B. lactis + PreforPro

- Decreases in bacteria often associated with increased gut inflammation and GI disorders, infection and immune dysfunction:
 - *Citrobacter*
 - *Desulfovibrio*
 - Trending decrease in *E. Coli*
- Increases in beneficial bacteria associated with immune and GI health:
 - *Lactobacillus* (10x increase)
 - *Gardnerella* / *Bifidobacterium*

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Rationale

- Improves the growth of beneficial bacteria

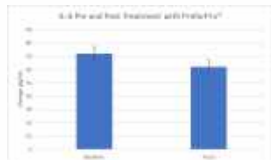
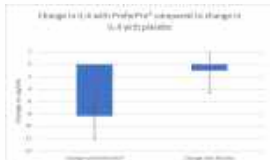
- Benefits of *B. bifidum***
 - Helps weight management
 - Boosts Immunity
 - Prevents Infections
 - Alleviates Allergy
 - Beneficial for the GI Tract
 - Improves Gut Microbiota
 - Improves GI Wellbeing
 - Ameliorates occasional Diarrhea and Constipation
 - Stimulates Growth in Infants
 - Beneficial for the Elderly
 - Exhibits Antioxidant Properties
 - Degrades Oxalate

- Benefits of *Eubacterium***
 - Most abundant genera in the healthy human gut
 - Butyrate producing bacteria
 - Supports digestive health
 - Stimulates enterocyte turnover
 - Maintains tight barrier junctions
 - Forms beneficial phenolic acids
 - Exhibits Antioxidant Properties
 - Role in the synthesis of Vitamin K
 - Supports Bone health, Cognitive health and Heart health
 - Positively influences the metabolic status of the host

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Systemic Inflammation - Interleukin 4 (IL-4)

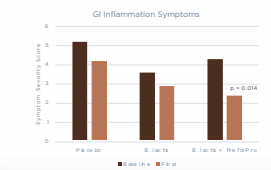
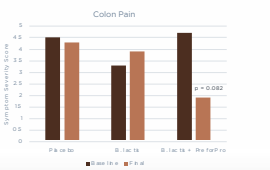
- No corresponding changes were seen pre- and post with placebo.
- IL-4 was significantly reduced from pre- to post treatment with PreforPro*
- There was a significant change in circulating IL-4 on the population taking PreforPro* relative to the placebo.

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Clinical Results - PreforPro

- Improvements in GI inflammation symptoms and a trending improvement in colon pain

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Clinical Results - PreforPro (Clinical 2)

- Larger Increase in *Lactobacillus* and short chain fatty acid-producing microbial taxa

Decreases in bacteria often associated with increased gut inflammation and GI disorders, infection and immune dysfunction:

- Citrobacter*
- Desulfovibrio*
- Trending decrease in *E. Coli*

Increases in beneficial bacteria associated with immune and GI health:

- Lactobacillus* (Dx increase)
- Gardnerella*/*Bifidobacterium*

B. lactis + PreforPro

Taxa	LogFC (approx.)
Citrobacter	-4.5
Desulfovibrio	-3.5
E. coli	-2.5
Lactobacillus	3.5
Gardnerella	4.5
Bifidobacterium	5.5

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Conclusions:

- Substantially enhanced the growth of beneficial bacteria, including:
 - Bifidobacterium bifidum*
 - Eubacterium spp.*
- Decrease in allergy-inducing IL-4
 - No corresponding changes with Placebo
- Strong Trend decrease in bad cholesterol
 - Especially for those with excess lipids in the blood

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Conclusions

- Improvements in GI inflammation symptoms and a trending improvement in colon pain
- Larger increase in *Lactobacillus* and short chain fatty acid-producing microbial taxa

The addition of PreforPro as a combination therapy may alter gut ecology to extend the GI benefits of consuming B. lactis or other probiotics.

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Structure-Function Claims


- Supports a healthy intestinal tract
- Promotes optimal health by supporting normal gut microflora
- Supports the proliferation of beneficial bacteria that comprise a healthy colon, for digestive health
- Supports the growth of normal beneficial bacteria in the gut and inhibits others
- Promotes a healthy immune system and function



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One SMALL DOSE for Prebiotics, One GIANT LEAP for Gut Health.



No gas
Doesn't create gas or bloating

Clinically proven
Proven to influence intestinal production of the gut

It's introduced in a small dose of 1 capsule daily. Proven to help with gas, bloating, and constipation.

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Thank You!

Manufactured by scientists, sustained by animals.

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