

Keystone Postbiotic

for foundational gut microbiome health

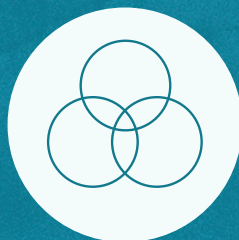


HEALTH INDICATION



Microbiome health,
GI discomfort, immunity

3 SYNERGISTIC MECHANISMS OF ACTION



Keystone Postbiotics' intentionally selected ingredients deliver three synergistic mechanisms of action in the GI tract that together help support and strengthen foundational gut microbiome health.

FUNCTIONAL REDUNDANCY



Keystone Postbiotic is produced through the fermentation of oats with two *Lactiplantibacillus* and *Lacticaseibacillus* probiotic strains selected to facilitate tightening of the intestinal barrier by promoting short chain fatty acid production and regulate levels of cytokines that promote responsible immune function.

Benefit Areas^{1,2}

- ✓ Promotes microbiome health
- ✓ Supports production of beneficial keystone bacteria
- ✓ Reduces gas and bloating
- ✓ Strengthens immune performance
- ✓ Supports emotional wellbeing/mood

CLINICAL TAKEAWAYS

Keystone Postbiotic precision microbiome modulation

800%

improvement in 33 beneficial endogenous gut bacteria

24000%

increase in endogenous *Akkermansia*

7000%

reduction in 38 potentially harmful gut bacteria

68%

of participants improved their emotional wellbeing

PROVEN

reduction in GI distress

>50%

improvement in gas and bloating



Prebiotic/postbiotic effect

Keystone is a postbiotic that is designed to be a postbiotic, not just comprised of dead bacteria. Function-specific strains combine with fermented oats to release metabolites in the gut acting as 'gut fertilizers' that supercharge the microbiome resulting in a healthy gut and immune system.

Endogenous vs. exogenous bacteria?

Endogenous bacteria already live in your gut. Nourishing resident species, like *Akkermansia mucinophila*, strengthen the ecosystem that's uniquely yours. In contrast, exogenous bacteria, such as oral probiotics, may have difficulty colonizing the gut and eliciting a benefit. While helpful, fostering your own endogenous strains often drives greater function, resilience, and lasting effect.

TARGETED MICROBIOME MODULATION

Upregulates endogenous butyrate producing bacteria up to **63000%** with a significant drop in potentially harmful bacterial species.

In the group that received Keystone Postbiotic, there was a significant upregulation of 33 endogenous microbes. The 10 most upregulated taxa were considered beneficial microbes such as *Akkermansia*, *Eubacterium*, *Bacteroides*, *Alistipes*, and *Bifidobacterium adolescentis*, strains associated with SCFA production and immune modulation.

Akkermansia, an anti-inflammatory/butyrate producing strain increased in the gut up to 24000%.

A decrease was observed in 38 microbial taxa with the top 10 being considered non-beneficial/harmful microbes such as *Prevotella*, *Megasphaera*, and several species of *Haemophilus*, strains associated with inflammation, bacterial vaginosis and IBD, respectively. There was not a major shift in endogenous microbial diversity.

Clinical trial summary — microbiome modulation²

Goal

To determine the effect of Keystone Postbiotic on GI health and microbiome modulation over a 4-week intervention.

Endpoints

- Measure short-chain fatty acids and inflammatory and immune markers
- Measure fecal microbiome diversity
- Evaluate impact on quality of life (SF-36, GSRs, DASS21) questionnaire

Design

Randomized, double-blind, placebo-controlled, decentralized clinical trial in the United States approved by Advarra IRB#00000971.

Method

- Healthy individuals (n=76) who self-reported with mild to moderate GI disturbances
- Participants received 300 mg of either Keystone Postbiotic or a placebo daily
- Conducted over a 4-week period
- Fecal and blood samples were collected in clinic, at the beginning of the trial and again 4 weeks

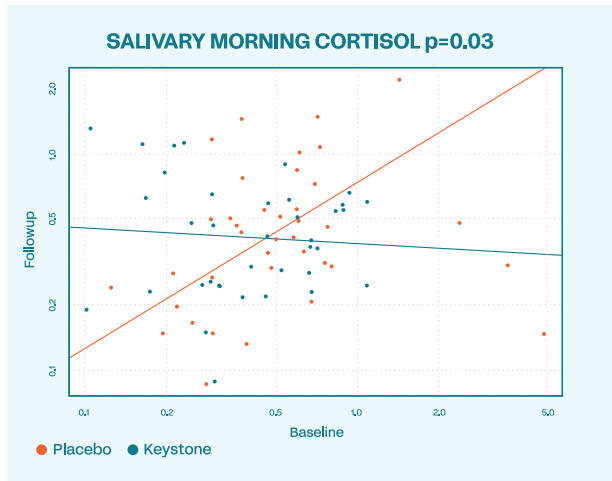
Results

- In the group that received Keystone Postbiotic, there was a significant upregulation in endogenous beneficial microbes such as *Akkermansia*, *Eubacterium*, *Bacteroides*, *Alistipes* and *Bifidobacterium adolescentis*, strains associated with butyrate production and immune modulation compared to the placebo group at 4-weeks. A decrease was observed in non-beneficial strains.
- Participants on Keystone had elevated rates of butyrate production reported in their blood samples and significantly lower rates of cortisol production compared to placebo controls.
- Gas and bloating decreased over 4-weeks, confirming the pilot study results.
- Emotional well-being statistically improved after 4 weeks compared to the placebo group.
- No GI distress was observed.

These results suggest Keystone Postbiotic supports **microbiome health, immune performance, emotional wellbeing, and reduces gas and bloating.**

Supports an increase in health-promoting microbial species

TAXA	COMMON FUNCTION	% CHANGE	P-VALUE < 0.001
Up regulated			
<i>Bacteroides intestinalis</i>	Complex carb utilization	171808	*
<i>Alistipes dispar</i>	Butyrate production	63720	*
<i>Eubacterium_G_sp000432355</i>	Butyrate production	23452	*
<i>Akkermansia_sp001580195</i>	Anti-inflammatory/butyrate	24162	*
<i>Eubacterium_R_sp000436835</i>	Butyrate production	18560	*
<i>Odoribacter_laneus</i>	Glucose control	13496	*
<i>Akkermansia_muciniphila_B</i>	Anti-inflammatory/butyrate	2589	*
<i>Bifidobacterium_pseudocatenuatum</i>	Anti-inflammatory	858	*
Down regulated			
<i>Haemophilus D group (2 species)</i>	Disease serotypes	-53230	*
<i>Haemophilus parainfluenzae (6 strains)</i>	Opportunistic pathogen	-31373	*
<i>Prevotella_sp900557255</i>	Inflammation	-19568	*
<i>Megasphaera_sp001546855</i>	Bacterial vaginosis	-7436	*

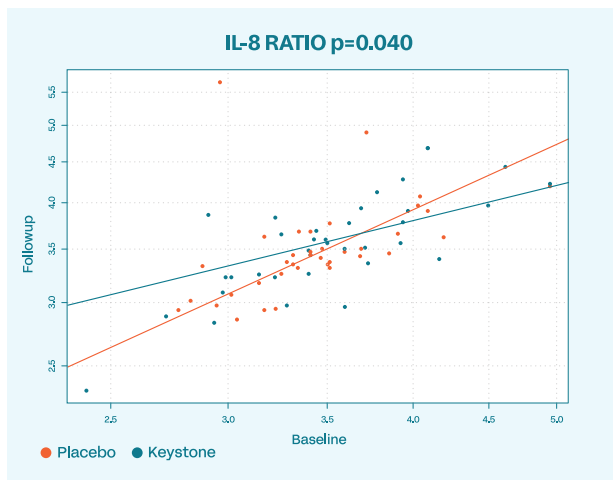


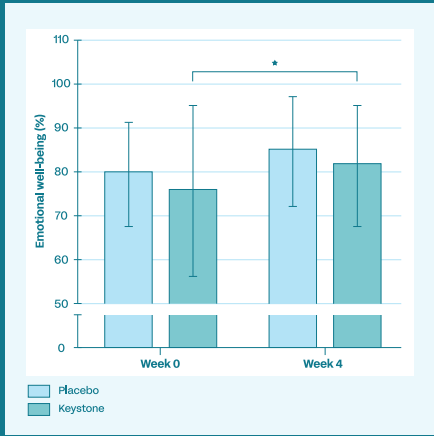
CORTISOL SIGNIFICANTLY LOWERED

After 4 weeks, participants taking Keystone Postbiotic showed a **significant reduction in the rate of cortisol production** ($p=0.03$). Lower cortisol, a primary stress hormone, indicates a shift toward a **healthier stress response**. This outcome may be linked to Keystone's ability to reduce harmful pathogens and inflammatory burden, thereby lessening physiological stress on the body.

IL-8 SIGNIFICANTLY IMPROVED

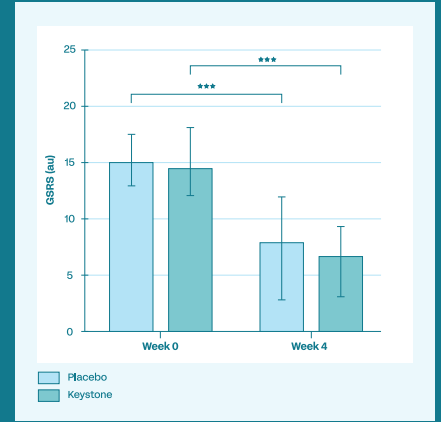
The Keystone Postbiotic cohort demonstrated a **lower rate of inflammatory activity and improved immune performance** after 4 weeks. Specifically, modulation of **IL-8**, a key cytokine central to immune regulation, was significantly improved ($p=0.040$). This indicates Keystone helps the body respond with a more balanced, anti-inflammatory immune profile—supporting both gut and systemic resilience.





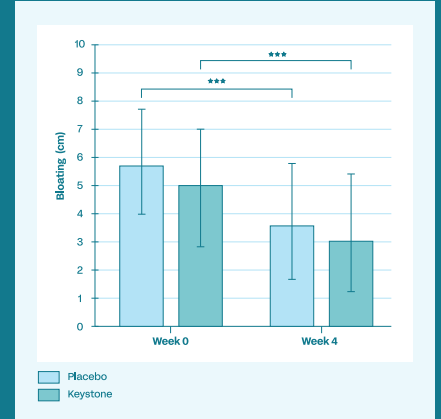
68% IMPROVED THEIR EMOTIONAL WELLBEING

Participants on Keystone Postbiotic demonstrated a significant decrease in feeling low and statistically improved their emotional well-being after 4 weeks ($p < 0.05$).



GI SYMPTOMS & BLOATING DECREASED

GI symptoms and bloating decreased from baseline ($p \leq 0.001$) in the Keystone Postbiotic cohort. This outcome reflects the trend observed in the pilot clinical study.



RECOMMENDED DOSE

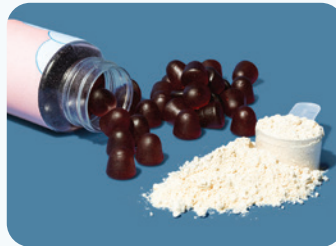
300 mg of Keystone Postbiotic per day

GRAS | Allergen-free | Kosher Parve
Produced in the USA



SOURCES

1. Verb Biotics Pilot Clinical on Keystone Postbiotic – Gas and Bloating, 2024
2. Verb Biotics Clinical Trial on Keystone Postbiotic – Microbiome Modulation, 2025



FORMATS

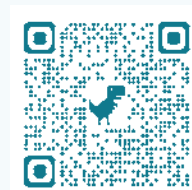
Add shelf-stable Keystone Postbiotic to powders, capsules, tablets, food, beverage, kombucha, gummies.

Let's talk!

Partner with us to innovate and disrupt with differentiated, targeted biotic ingredients.

Scan the code or email us at sales@verbbiotics.com to talk to our sales team.

VERBBIOTICS.COM



Improving health through microbiome innovation

This publication does not constitute or provide scientific or medical advice, diagnosis, or treatment. This information is based on Verb Biotics' current knowledge and only contains scientific and technical information for business-to-business use. Verb Biotics makes no representation or warranty of the accuracy, reliability, or completeness of the information and results to be obtained. Use of this information is at your discretion and risk. It does not relieve you of your obligation to comply with all applicable laws and regulations and to observe all third-party rights. Nothing herein relieves you from carrying out your own formulation determinations and tests including stability testing of the finished product. Country or region-specific information should also be considered when labeling or advertising to final consumers. The content of this document is subject to change without further notice.