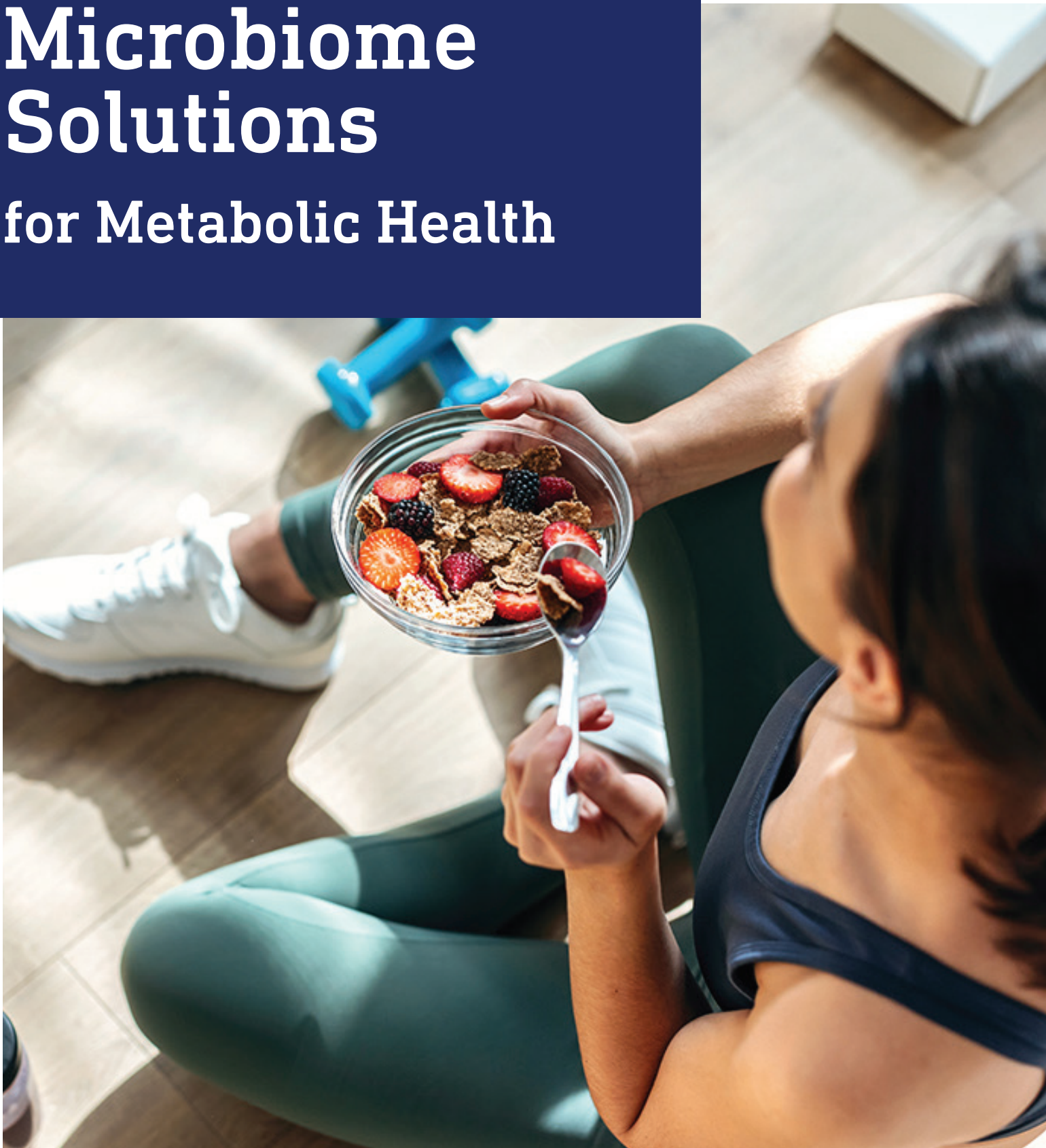




Microbiome Solutions for Metabolic Health



Defining Metabolic Health

Metabolic health may not have a standard medical definition, but it is often associated with ideal levels of these factors¹—without the use of medications:

-  **Blood sugar**
-  **Triglycerides**
-  **High-density lipoprotein (HDL) cholesterol**
-  **Blood pressure**
-  **Waist circumference**



ONLY 12%
(1 in 8) of U.S. adults have optimal metabolic health.³

Yet, metabolic health is a growing concern. It continues to deteriorate worldwide due to a variety of factors including people’s eating habits, behaviors, lack of exercise and smoking.²

In fact, sub-optimal metabolic health leaves the majority of U.S. adults at increased risk for serious diseases such as heart disease, diabetes and stroke.³

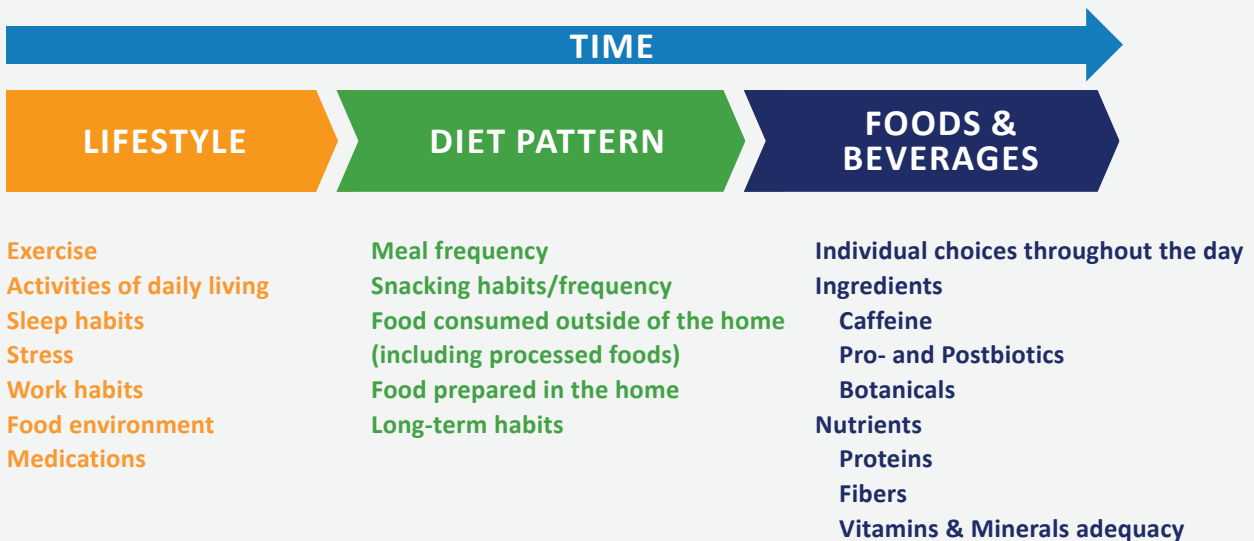


Number of U.S. Adults

Factors Impacting Long-Term Metabolic Health

Poor diets—particularly those starting with school-age children—may build adult habits for unhealthy choices and ultra-processed food consumption. Many products available in mainstream diets contain very high sugar content levels, and consumers are increasingly aware of the risks that excess sugar consumption can pose.³

At the same time, proper diet and specific components, including prebiotics and probiotics, can play a role in supporting metabolic health.



Consumers Taking Note

57% of consumers plan to focus on their digestive health and 37% say they will watch their weight/waistline.⁴

The main motivations influencing consumers' eating patterns? Not surprisingly, weight loss, improving physical appearance and feeling active.⁵

60% OF GLOBAL CONSUMERS are planning to improve their general health and wellness in the next 12 months.⁴



MOTIVATORS FOR FOLLOWING EATING PATTERN/DIET



THE ROLE OF GOOD BACTERIA IN METABOLIC HEALTH

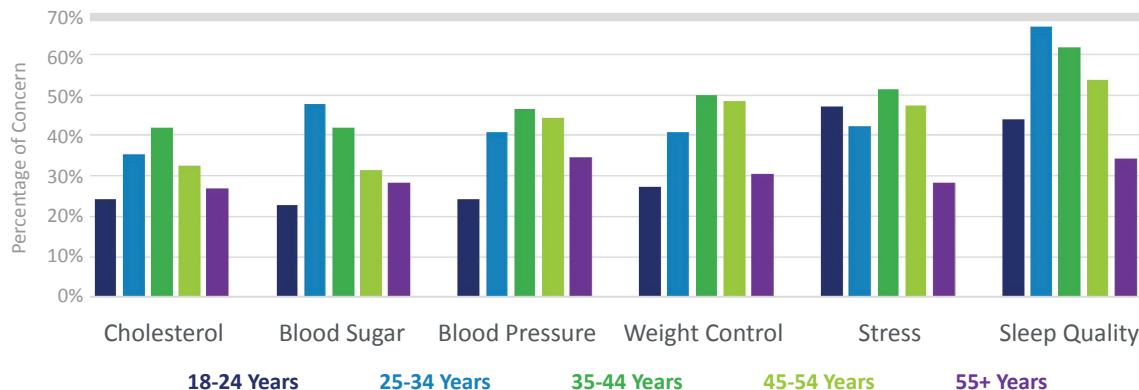
Akkermansia muciniphila regulates genes related to appetite control.⁸

Bifidobacterium animalis, a short chain fatty acids (SCFAs) producer, supports energy metabolism.⁹

Informed consumers understand and are concerned about interconnected areas of metabolic health including cholesterol levels, blood sugar, blood pressure, weight control, stress and sleep quality.⁶

People with negatively affected metabolic health show an altered microbiota, with lower diversity and a specific decrease in critical bacteria such as *Akkermansia muciniphila* and *Bifidobacterium animalis*.⁷

58% OF GLOBAL CONSUMERS are aware of the benefits that bacteria in the digestive system can have on overall health.¹⁰



IT MAKES SENSE THAT TODAY'S CONSUMERS ARE LOOKING FOR SOLUTIONS TO HELP SUPPORT THEIR METABOLIC HEALTH. AND, THE MICROBIOME HOLDS AN IMPORTANT ROLE IN METABOLIC HEALTH.



The Secret to Get-to-Market Success

With consumers on the lookout for products to positively impact their metabolic health, market opportunities abound. Basic cookie-cutter vitamin and mineral solutions such as fish oil are no longer ‘enough’ for savvy consumers. They are in search of innovative dietary supplement solutions with clinically backed biotics and botanicals that can help support their metabolic health. Opportunity awaits for products that can get to market as quickly as possible, with ingredients that are shown to be effective and supported by science.

BIOTICS AND BOTANICALS IN ONE PLACE

What makes ADM’s microbiome solutions portfolio different? It houses an extended family of biotics and botanical product solutions that support metabolic health.

PRE, PRO, POST: BIOTICS WITH POTENTIAL

Consumers have an appetite for products with ingredients shown to support their metabolic health. Prebiotics that feed the intestinal microbiota to promote health benefits, probiotic microbiome solutions for holistic and proactive health, and postbiotic bioactive compounds that confer metabolic health benefits—all are capturing the attention of consumers focused on better health outcomes.

BIOTICS

ADM offers a science-backed portfolio of biotics that provide you with best-in-class microbiome solutions, targeting benefits related to metabolic pathways and meeting the health and well-being needs of your customers.



Fibersol® Prebiotic Fiber

Fibersol® is a premier line of soluble prebiotic dietary fiber backed by over 30 years of extensive clinical research.

More than 100 published studies demonstrate its prebiotic and physiological benefits, including:

- Clinically demonstrated digestive health benefits
- Prebiotic effect, nourishing the intestinal flora
- Satiety and post-meal blood glucose, insulin and triglyceride control benefits

At 10g with a meal, Fibersol®:¹¹

- May delay hunger and stimulate appetite-regulating hormones GLP-1 and PYY
- May increase satiety perception
- May increase appetite-regulating hormone GLP-1 in healthy individuals

At 4-6g with each meal, Fibersol®:¹²

- Helps reduce blood sugar levels after a meal*
 - Helps minimize blood sugar spikes after a meal*
 - Helps reduce blood insulin response after a meal*
 - Helps reduce the rise in blood insulin after a meal*
- *that are within the normal range in healthy individuals*

At 5-6g with each meal, Fibersol®:¹³

- Helps attenuate the rise in blood triglycerides following the meal (that are within the normal range in healthy individuals)
- Helps retain healthy blood triglyceride levels

At 3.75g per serving*, Fibersol®:^{14,15}

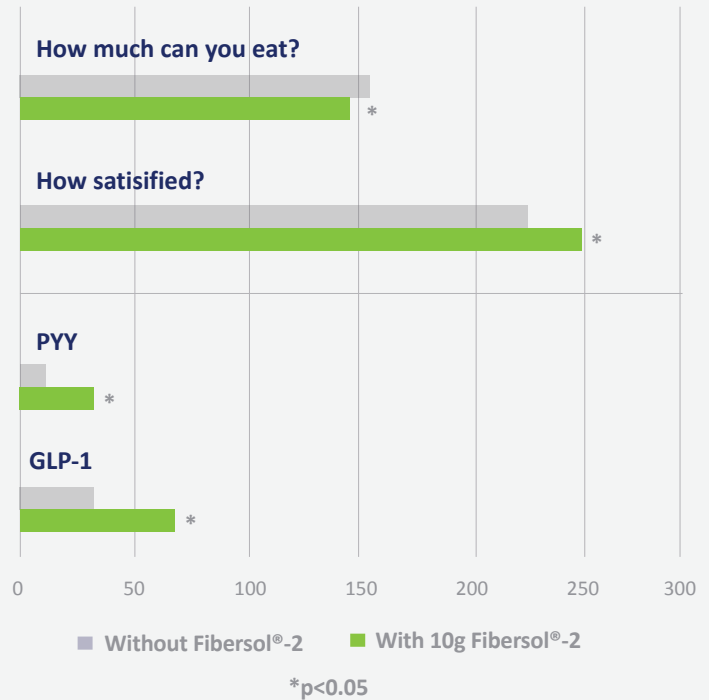
- May help nourish the intestinal flora and maintain a healthy intestinal tract environment
- *for a total of 15g per day over 3 weeks*

At 4-8g per day*, Fibersol®:¹⁷

- Helps support/maintain intestinal regularity
- Helps relieve occasional constipation
- May support gut health
- Improves stool consistency

**for 2 weeks*

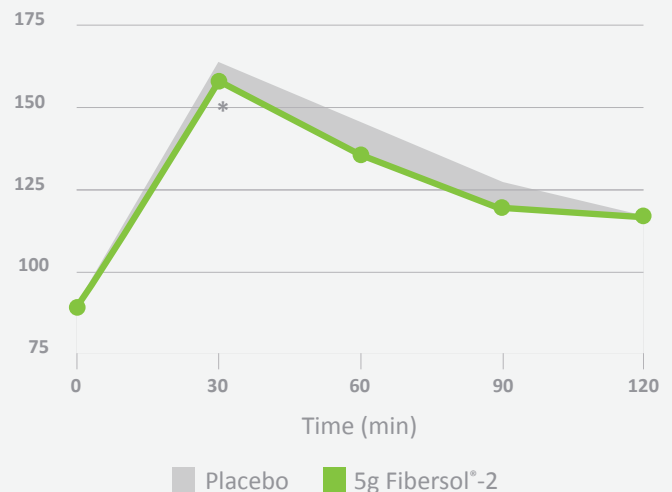
4 HOURS AFTER A MEAL



Ye, Z (2015) Nutr Res. 35:393-400

FIBERSOL® IS A RESISTANT MALTODEXTRIN THAT IS NOT ASSOCIATED WITH SEVERE GASTROINTESTINAL SYMPTOMS. FIBERSOL® IS WELL TOLERATED, AT UP TO 68g/DAY.¹⁶

POST-MEAL BLOOD SUGAR LEVELS



Yuasa, M. et al. (2004). Jpn Innov Food Ingrid Res 7:83-93

BPL1™ Probiotic and Postbiotic

BPL1™ (*Bifidobacterium animalis* subsp. *lactis* CECT 8145) is ADM's proprietary, award-winning strain with clinically documented results in aspects related to metabolic health.

Daily amount = 10 Billion cfu/day or equivalent postbiotic amount (10 or 34mg/day in dietary supplements and food & beverage applications, respectively)

Probiotic clinical evidence includes 8 scientific papers and 1 controlled trial (CT).

Emerging and *in vitro* evidence suggests BPL1™ Probiotic may help support:¹⁸

- Weight management in combination with diet and exercise
- Metabolic health pathways
- A healthy BMI in conjunction with diet and exercise

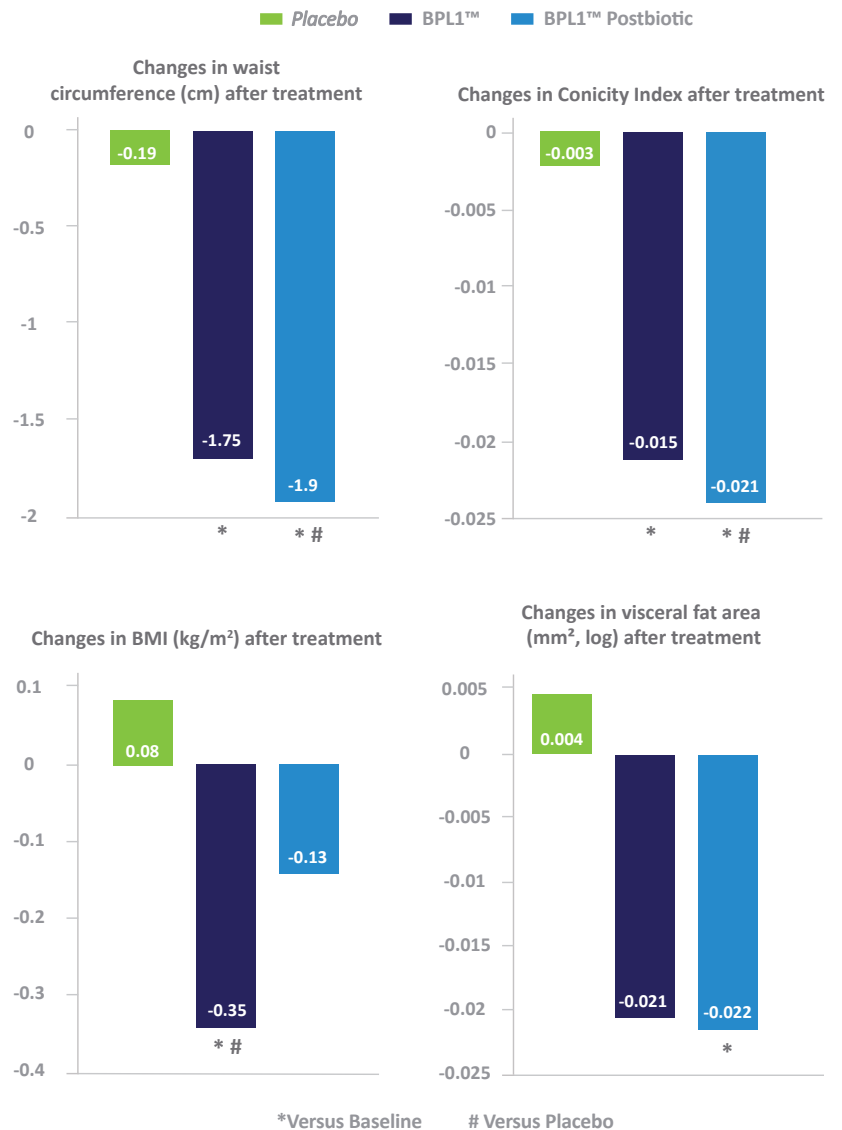
BPL1™ Postbiotic (*Bifidobacterium animalis* subsp. *lactis* CECT 8145) is ADM's proprietary, award-winning postbiotic with clinically documented results in aspects related to metabolic health.

Postbiotic clinical evidence includes 10 scientific papers and 1 randomized controlled trial (RCT).

Emerging and *in vitro* evidence suggests BPL1™ Postbiotic may help support:¹⁹

- Visceral fat reduction in combination with diet and exercise
- A healthy waist circumference in conjunction with diet and exercise
- Metabolic health pathways

A CLINICAL STUDY¹⁶ SHOWS BPL1™ IMPROVES MEASURES OF METABOLIC HEALTH IN HEALTHY HUMANS:



RANDOMIZED DOUBLE-BLIND, PLACEBO-CONTROLLED DESIGN



12 Weeks

- Waist circumference
- Conicity Index
- Body Mass Index
- Visceral fat

Inclusion: aged > 18 with a waist circumference (WC) ≥ 102 cm for men and ≥ 88 cm for women
 Exclusion: WC < 102 cm for men and < 88 cm for women, and > 150 cm for both gender; BMI ≥ 40 kg/m, antibiotic treatment, diabetes, pregnancy, abnormal thyroid, anemia, alcoholism, hypocaloric diet, intake of food supplements, intestinal disease



Active Lifestyle Formulation Probiotic

This proprietary probiotic formulation has clinically documented results in reducing measures related to oxidative stress in healthy people practicing prolonged, intense exercise.

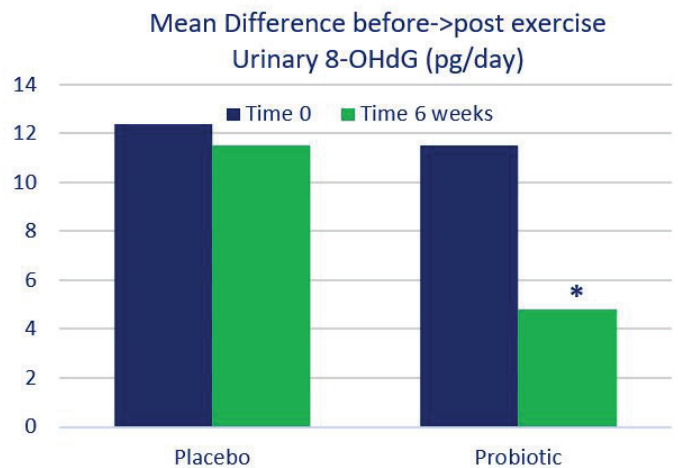
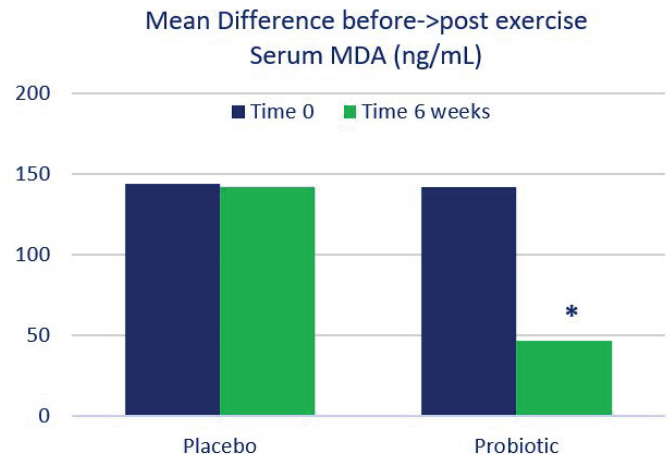
It is a blend of:

- ES1 (*Bifidobacterium longum* CECT 7347)
- BPL4 (*Lactocaseibacillus casei* CECT 9104)
- BPL15 (*Lactocaseibacillus rhamnosus* CECT 8361)

Daily Amount = 1 Billion cfu/day

Clinical evidence,¹⁹ including 1 scientific paper and 1 clinical trial, suggests the use of Active Lifestyle formulation may support:

- Reduction of some lipid-related oxidative stress biomarker, MDA after exposure to exercise, compared to placebo
- Positive effect on post-exercise levels of serum Ox-LDL compared to baseline and urinary 8-OHdG compared to placebo



*: Between-Group Difference p Value <0,05

#: Difference from baseline p Value <0.05

MDA: malondialdehyde, lipid peroxidation biomarker
Ox-LDL: oxidized low-density lipoprotein, lipid peroxidation biomarker
8-OHdG: 8-oxo-2'-deoxyguanosine, major product of DNA oxidation

DE111[®] Probiotic

DE111[®] provides a host of benefits for body composition by supporting a balanced gut microbiome.

Clinical dose = 5 Billion cfu

Clinical evidence suggests DE111[®] may:

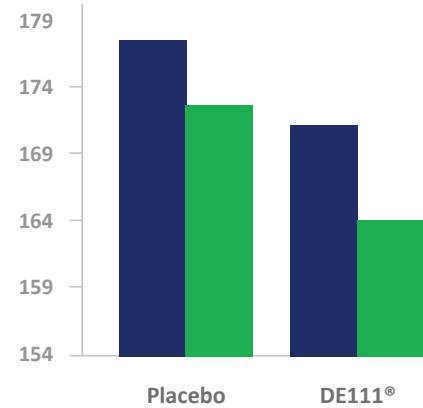
- Improve body composition in female athletes²⁰
- Support healthy body fat percentage in women in combination with strength training²⁰

DE111[®] significantly improved body fat percentage compared to control (p=0.018)

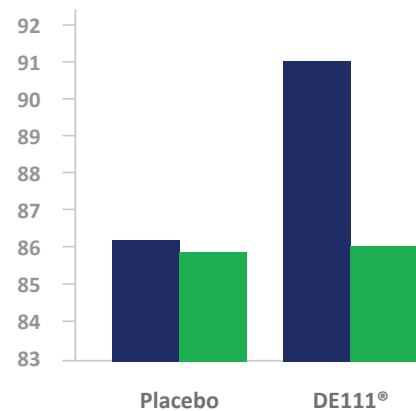
Outcome Measures:

- Strength & Athletic Performance
 - Body Composition & Muscle Thickness
All training was performed under the supervision of a certified strength and conditioning specialist (CSCS).
- Help decrease fasting blood glucose by 6% after 4 weeks while staying in the healthy range (70-100 mg/dl)^{21,22}
 - Supplementation with DE111[®] (5 Billion cfu/day)

TOTAL CHOLESTEROL



FASTING GLUCOSE



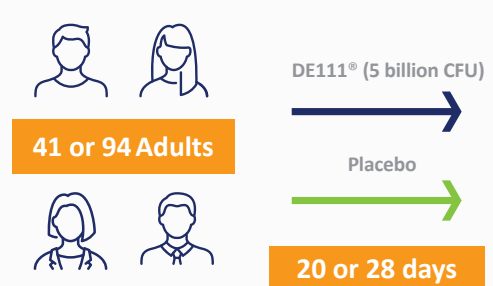
RANDOMIZED DOUBLE-BLIND, PLACEBO-CONTROLLED DESIGN



Outcome Measures:

- Strength & athletic performance
- Body composition & muscle thickness

RANDOMIZED DOUBLE-BLIND, PLACEBO-CONTROLLED DESIGN



Outcome Measures:

- Fatty acid analysis of the stool
- Microbiome analysis
- CRP levels
- Glucose levels
- LDL/HDL

From Biotics to Botanicals

While ingredients like fiber and the 'biotics' (prebiotics, probiotics and postbiotics) are commonly associated with digestive health, a number of botanical ingredients have long been linked to digestive health as well.²³

Botanicals have become popular for enhancing metabolic health and weight-loss outcomes. Botanicals may serve as an excellent source of bioactive compounds to support metabolic health because they contain a wide range of phytochemicals with diverse metabolic effects.²⁴

For example, appetite-suppressing botanicals may be associated with supporting weight management and blood sugar control.²³ Caffeine-providing botanicals are common in launches with claims associated with weight management and blood glucose control.²³



BOTANICALS

ADM offers a curated portfolio of well-known, high-quality and trustworthy functional botanical extracts that are derived from nature and deliver on key wellness attributes.

Utilizing water extraction methods means offering botanicals without any undesirable flavor or sensory impacts. With deep expertise in raw materials, gentle extraction technologies and partnership approach, ADM can help you deliver consumer-preferred solutions to market.



GRAPE SEED EXTRACT

This high-quality Grape Seed (*Vitis vinifera* L.) extract is a multi-functional ingredient that can be used in dietary or food supplements to help today's consumers support their individual health goals.

Supplementing the diet with grape seed extract may:

- Support lower diastolic blood pressure in healthy adults²⁵
- Be associated with:
 - Lower postprandial glucose response in healthy individuals²⁶
 - Greater muscle mass and lean mass in healthy individuals²⁵

Powder Standardized to:

- Proanthocyanidins at 90% min.
- Total polyphenols at 85% min.
- Monomeric flavan-3-ols at 5-15% (target 10%)



GREEN ROOIBOS EXTRACT

Incorporating Green Rooibos (*Aspalathus linearis*) extract in products can help attract consumers who associate the botanical with everyday stress and mood support, energy and sleep quality.²⁷



Powder Standardized to:

- Dihydrochalcones (8%-18%)
- Flavones (2%-6%)

TEA EXTRACTS

Choose from a portfolio of high-quality green and black tea extracts to add to your product—and appeal to consumers looking to address their health and wellness goals. Many consumers connect teas with supporting heart health, everyday stress management, metabolism/weight management and more.²⁸

Supplementing the diet with green tea may support healthy mood and stress levels.^{29,30}

Standardized to:

- Green Tea
 - Polyphenols 40-60%
 - EGCG 8-16%
 - Caffeine 4.5-7%
- Black Tea
 - Polyphenols 10%
 - Caffeine 3-10%



YERBA MATE EXTRACT

Yerba Mate (*Ilex paraguariensis*) extract helps address consumers' need for better products that support their overall well-being with naturally occurring caffeine.

Supplementing the diet with yerba mate may support healthy mood and stress levels.³¹

Standardized to:

- Caffeoylquinic acids 20%
- Caffeine 6% or fortified 8%

WKUP BLEND

A proprietary mix of trustworthy functional botanicals derived from nature, WKUP Blend helps support consumers looking for low/no caffeine energy and mental focus enhancement.

In a serving of 10.6g of WKUP there is:

- Fruit Up® (10.5g)
- Green tea extract (49mg)
- Guarana seed extract (32mg)
- Elderberry fruit powder (0.5mg)

ADM for Market-Pleasing Microbiome Solutions

**ADM IS A GLOBAL
LEADER IN END-TO-END
MICROBIOME SOLUTIONS.**

We can help differentiate your brand with clinically studied and consumer-driven formulations using our diverse portfolio of prebiotics, probiotics, postbiotics and botanical extract ingredients.

Even better? ADM can help you get your novel dietary supplement and food & beverage offering to market, faster. Not only because we deliver the biotic and botanical ingredients you need—all from one supplier—but we also help you create solutions that actually work to meet consumer demands, are backed by science and have minimal sensory impact due to our gentle extraction methods and flavor/formulation expertise.



Your Partner in Sustainability

ADM continues to scale up sustainability efforts to develop new solutions for our customers, making us uniquely positioned to be your sustainability partner.

Combined with ADM's unparalleled scale, integrated supply chain, transport and logistic capabilities and our deep-rooted relationships in agriculture, we connect you back to the fields and farmers where ingredients are sourced.

ADM'S EXPANSIVE GLOBAL NETWORK AND INDUSTRY EXPERTS

- 140** scientists devoted to microbiome R&D
- 40+** partnerships with universities in 17 countries
- 13** R&D and applied research centers
- 5,800** research reports included in our database
- 40** years of experience in studying raw materials

**ADM DELIVERS THE ABILITY TO HELP YOU ACHIEVE YOUR SUSTAINABILITY
AND SOURCING GOALS AND ADDRESS YOUR SCOPE 3 EMISSIONS.**



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