June 1, 2026

Human-Resident *Bifidobacterium longum* BB536 May Improve Diarrhea-Related QOL Scores and Reduce Body-Odor-Related Metabolites in Male Athletes Consuming a High-Protein Diet

Published in the Scientific Journal *Journal of the International Society of Sports Nutrition*

In a joint research study, Morinaga Milk Industry Co., Ltd., together with Professor Shuichi Machida of the Graduate School of Health and Sports Science at Juntendo University and Professor Daisuke Asaoka of the Juntendo Tokyo Koto Geriatric Medical Center, examined the effects of ingesting *Bifidobacterium longum* BB536, a human-residential bifidobacterial species, in male athletes consuming a high-protein diet. The findings suggest that BB536 may improve diarrhea-related Quality of Life (QOL) scores and reduce body-odor-related metabolites. These research findings were published in the scientific journal *Journal of the International Society of Sports Nutrition* on April 28, 2026.

Key Findings

- Ingestion of BB536 was associated with a trend toward improvement in diarrhea-related QOL scores.
- Among participants whose diarrhea-related QOL scores improved, the relative abundance of the butyrate-producing genus *Faecalibacterium* in the gut microbiota increased.
- The effect of BB536 on body-odor-related metabolites may depend on gut microbiota type (enterotype[1]).
- In certain enterotypes, BB536 was suggested to reduce body-odor-related metabolites in athletes consuming a high-protein diet.

1. Research Background

Athletes frequently consume high-protein diets to support muscle recovery and growth. However, excessive protein intake raises concerns about disruption of the gut environment, gastrointestinal symptoms, and an increase in metabolites that contribute to body odor. While probiotics are known to improve the gut environment, research targeting athletes on high-protein diets has been limited. Against this background, the research team conducted an exploratory study to examine the effects of ingesting BB536, a strain that Morinaga Milk has been researching for more than 50 years.

2. Research Methods

A randomized, double-blind, placebo-controlled, parallel-group trial was conducted in 60 healthy male athletes belonging to athletic clubs at Juntendo University. Participants ingested either a capsule containing BB536 or a placebo capsule for 4 weeks, with both groups additionally consuming 70 g/day of whey protein. Outcomes assessed included gastrointestinal symptoms (Izumo Scale[2]), gut microbiota composition (16S rRNA gene sequencing), and body-odor-related metabolites (skin gas[3] measurements).

3. Research Results

1) Gastrointestinal symptoms: BB536 intake showed a trend toward improvement in diarrhea-related QOL scores

Although no significant between-group difference was observed between the BB536 and placebo groups, the BB536 group showed a statistically significant within-group improvement in diarrhea-related QOL scores after 4 weeks of intake (Figure 1).

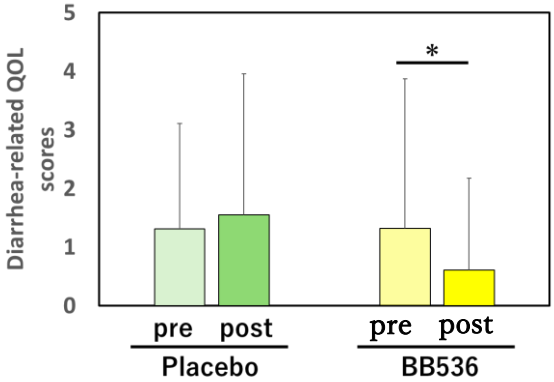

Figure 1. Changes in diarrhea-related scores

The diarrhea-related QOL score was calculated as the sum of the three diarrhea-related items on the Izumo Scale (range: 0–15).
(BB536 group: n = 29; placebo group: n = 30)
(*: $p < 0.05$; statistically significant difference determined by the Wilcoxon signed-rank test)

2) Gut microbiota: Among participants whose diarrhea-related QOL scores improved, the relative abundance of the butyrate-producing genus *Faecalibacterium* increased

In participants whose diarrhea-related QOL scores improved (responders), the relative abundance of *Faecalibacterium*—a butyrate-producing genus with anti-inflammatory properties—increased significantly more than in non-responders after 4 weeks of BB536 intake (Figure 2). These findings suggest that the improvement effect of BB536 on diarrhea-related QOL scores (as described in research result 1 above) may depend on the composition of the gut microbiota.

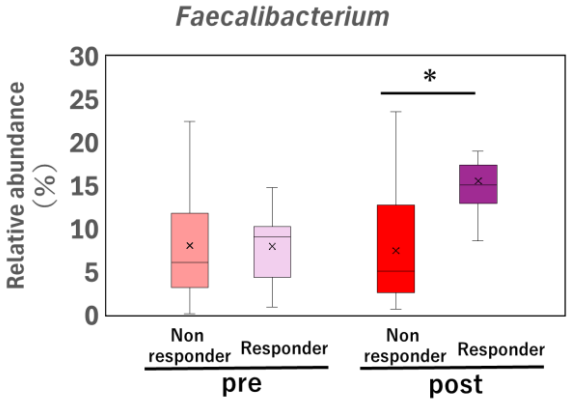

Figure 2. Changes in the relative abundance of butyrate-producing *Faecalibacterium* in responders and non-responders

The BB536 group was divided into responders (n = 9) and non-responders (n = 19), and the relative abundance of *Faecalibacterium* in the gut microbiota was calculated before and after intake.
(*: $q < 0.05$; statistically significant difference determined by nonparametric analysis of covariance, adjusted for multiple comparisons)

3) The effect of BB536 on body-odor-related metabolites may depend on gut microbiota type (enterotype)

To clarify how differences in participants' gut microbiota influence the effects of BB536 on body-odor-related metabolites, the participants were classified into the following two enterotypes based on their pre-intake gut microbiota composition.

・R-type: *Ruminococcus*-dominant (BB536 group: n = 8; placebo group: n = 10)
・F-type: *Faecalibacterium*-dominant (BB536 group: n = 21; placebo group: n = 20)

While no between-group difference in body-odor-related metabolites was observed between the BB536 and placebo groups in either enterotype, BB536 intake in the R-type was associated with a trend toward increased propionic acid and a significant increase in butyric acid. In the F-type, in contrast, BB536 intake was associated with a trend toward decreased ammonia and a significant decrease in methyl mercaptan (Figure 3).
These findings suggest that the effect of BB536 on body-odor-related metabolites may depend on enterotype, and that in the F-type in particular, BB536 may act to reduce body-odor-related metabolites in athletes consuming a high-protein diet.

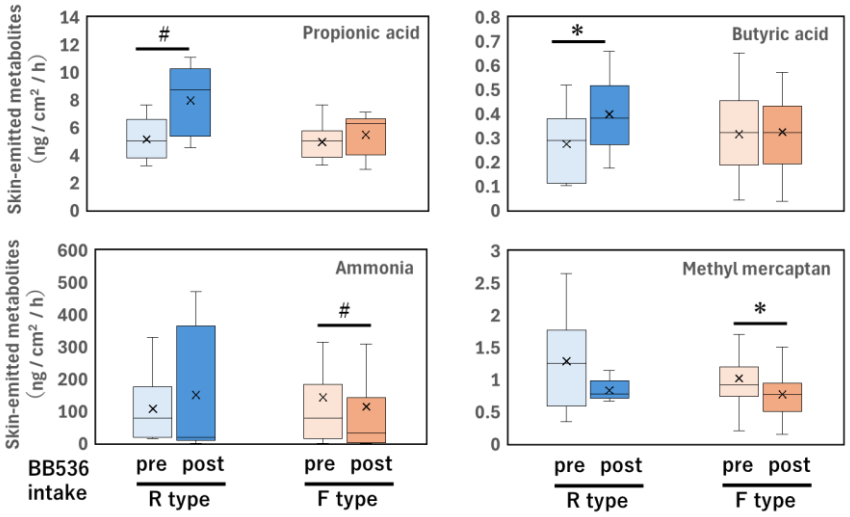

Figure 3. Enterotype-specific changes in metabolites induced by BB536 intake

The BB536 group was divided into R-type and F-type subgroups, and body-odor-related metabolites were measured before and after intake.
(*: $p < 0.05$; #: $p < 0.1$; statistically significant difference determined by the Wilcoxon signed-rank test, *$p < 0.05$ indicates statistical significance, whereas #$p < 0.1$ indicates a tendency toward significance)

4. Future Outlook
The results of this study point to the potential of personalized nutritional approaches based on differences in gut microbiota composition within the unique dietary context of athletes. As this was an exploratory study, we will continue to conduct further studies and advance the research and development of probiotics aimed at maintaining athletes' health and improving their quality of life.

*1 Enterotype
An enterotype is a concept used to classify patterns in the composition of the gut microbiota. Enterotypes reflect individual dietary and lifestyle factors and are considered to be associated with long-term dietary tendencies.

*2 Izumo Scale
The Izumo Scale is a self-administered questionnaire comprising 15 items that comprehensively assess five gastrointestinal symptoms across the upper and lower digestive tracts: heartburn, stomach pain, postprandial fullness, constipation, and diarrhea. Each item is rated on a six-point scale ranging from "not troubled at all (0 points)" to "troubled to an unbearable degree (5 points)." The QOL score for each symptom group (3 items per group) is calculated on a 0–15 scale, with higher scores indicating greater interference with daily life.

*3 Skin gas
Skin gas refers to trace volatile substances naturally released from the skin that contribute to body odor. Humans release numerous chemical compounds through the skin, and in recent years, it has become clear that metabolites derived from gut bacteria can be released from the skin via the bloodstream. As a result, changes in the gut environment may be reflected in skin gas and odor components.

Title: Bifidobacterium longum BB536 is associated with improvements in gastrointestinal symptoms and odor-related metabolites in microbiota-defined subgroups of male athletes consuming a high-protein diet: exploratory randomized double-blind placebo-controlled trial
Authors: Shu Miyamoto[1], Shin Yoshimoto[1], Noriko Katsumata[1], Natsumi Mutoh[1], Noriyuki Iwabuchi[1], Toshitaka Odamaki[1], Daisuke Asaoka[2], Shuichi Machida[3]
(1: Innovative Research Institute, R&D Division, Morinaga Milk Industry Co., Ltd. 2: Juntendo Tokyo Koto Geriatric Medical Center, 3. Graduate School of Health and Sports Science, Juntendo University)
Journal: *Journal of the International Society of Sports Nutrition* (2026)
(DOI: https://doi.org/10.1080/15502783.2026.2664664)

Reference information
Human-Residential Bifidobacteria; HRB
To date, more than 100 species of bifidobacteria have been identified. However, the bifidobacteria that inhabit the human gut are fundamentally different from those found in non-human hosts. Morinaga Milk's research and development focuses on bifidobacteria that reside in the human gut.
Morinaga Milk has designated the bifidobacterial species that characteristically inhabit the human intestinal tract as "Human-Residential Bifidobacteria (HRB)." Evidence suggests that bifidobacteria residing in the human gut have coevolved with human ancestors over more than 15 million years. We believe that this long process of coevolution is itself evidence that HRB have played a critically important role in human health.

Contact Information
Kazuaki Kajikawa, Investor& Public Relations Department
Shu Miyamoto, Microbial Exploration Research Section, Biotics Research Institute, R&D Division
Morinaga Milk Industry, Co., Ltd.
Tel: 03-6281-4682 Email: pr@morinagamilk.co.jp

Shuichi Machida, Professor, Graduate School of Health and Sports Science, Juntendo University
Tel: 0476-98-1001 Email: machidas@juntendo.ac.jp
Daisuke Nakamura, General Affairs Department Public Relations Division, Juntendo University
Tel: 03-5802-1006 Email: pr@juntendo.ac.jp