

# Science Review: *Bifidobacterium lactis* 420

## Introduction

Increasing evidence is now pointing to a crucial factor that links the intestinal microbiome with regulation of body weight and body fat mass. Dysbiosis—an imbalance within the microbiome—is now recognized to have wide clinical impacts, with links established to a diverse set of adverse health conditions including obesity. Genomic content and diversity in the microbiome has been shown to be different in obese individuals as compared with lean individuals.

A growing body of literature is supporting the use of probiotics in the management of body weight. *Bifidobacterium lactis* 420 is one such probiotic that has been studied in preclinical and clinical studies to have an impact on overall GI health, improved glucose intolerance, and body weight regulation.

### Research Highlights

- ✓ Preclinical and clinical findings from *B. lactis* 420 studies support its usage for body weight and body fat mass regulation.<sup>1,2</sup>
- ✓ *B. lactis* 420 produced a statistically significant reduction in body fat mass and waist circumference in overweight and obese healthy adults compared to placebo.<sup>1</sup>
- ✓ *B. lactis* 420 decreased plasma lipopolysaccharide levels, liver inflammation, and *E. coli* adhesion in the distal gut in obese and diabetic mice.<sup>2</sup>

## B420 and Adiposity in Human Clinical Trial

A randomized, double-blind, placebo-controlled, multicenter clinical trial with 225 overweight and obese healthy adults was conducted for six months to investigate the effects of *B. lactis* 420 alone and in combination with a fiber supplement on weight management, markers of inflammation, bacterial translocation, and fecal short-chain fatty acids.<sup>1</sup> Due to the lower number of observations in the B420 group (n=24) compared to the other

groups (n=35-37), a post-hoc factorial analysis was conducted to evaluate the independent effects of B420 and fiber supplement in the per-protocol population.

## Results

### Primary Outcome:

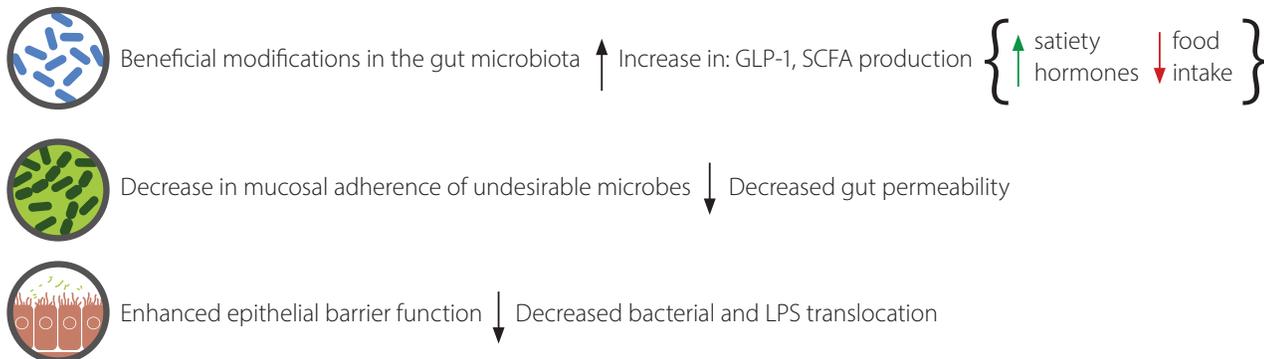
- Body fat mass: 1.4 kg (3 lb.) reduction in the B420+fiber group compared to placebo.<sup>1</sup>
- Out of the total 1.4 kg (3 lb.) body fat mass lost, 1.3 kg (2.86 lb) were lost from the trunk in the B420+fiber group.<sup>1</sup>
- The effect in the reduction of body fat mass induced by B420+fiber was maintained one month after the treatment period was completed.<sup>1</sup>

### Secondary Outcomes:

- Waist circumference: 2.4-cm or 1-inch reduction in waist circumference in the *B. lactis* 420 group compared to placebo in post-hoc factorial analysis.<sup>1</sup>
- Energy intake: ~300 kcal reduction, possibly due to appetite suppression, might be one of the mechanisms associated with *B. lactis* 420.<sup>1</sup>
- Zonulin and hs-CRP: post-hoc factorial analysis noted a trend towards a decrease in levels of circulating zonulin (a potential marker of gut barrier function and low-grade inflammation) and hs-CRP (a biomarker of inflammation) in the *B. lactis* 420 group compared with placebo.<sup>1</sup>
- Short-chain fatty acids (SCFAs): a significant increase in SCFAs, including propionic, butyric, and valeric acid, were seen in stool samples from the *B. lactis* 420 group compared with placebo in the post-hoc factorial analysis.<sup>1</sup>

SCFAs not only have a role in glucose and lipid metabolism, gut integrity, and immune function, they are also involved in appetite regulation.<sup>7</sup> Increased SCFAs have been shown to trigger the expression and secretion of anorectic gut peptides such as glucagon-like peptide 1 (GLP-1), peptide YY, and glucose-dependent insulinotropic polypeptide.<sup>8-11</sup>

### *B. lactis* 420 Potential Mechanisms of Action<sup>1,2,3-6</sup>



## B420 and Adiposity in Experimental Studies (2 experimental designs)

1. Obesity model mice were fed a high fat diet (HFD) with daily administration of *B. lactis* 420 for 12 weeks.<sup>2</sup>
2. Diabetic model mice were fed a high-fat ketogenic diet (KD) for 4 weeks and subsequently received daily administration of *B. lactis* 420 for 6 weeks thereafter.<sup>2</sup>

### Results:

- This study demonstrated that *B. lactis* 420 prevented fat mass accumulation in two different models, obesity model mice fed a HFD and diabetic-induced model mice fed a high-fat KD, when compared to these models not administered *B. lactis* 420.<sup>2</sup>
- Plasma lipopolysaccharide (LPS) levels decreased in both *B. lactis* 420 groups. LPS has been shown to enter circulation when gut barrier integrity is impaired and has a causal relationship to increase in obesity.<sup>11</sup>
- This preclinical study showed that *B. lactis* 420 has a potential beneficial impact on intestinal barrier function, body weight, and body fat regulation.<sup>2</sup>

### Emerging Science

- In the diabetic mouse model, the *B. lactis* 420 group demonstrated improved glucose metabolism possibly due to decreased circulating LPS levels.<sup>2</sup> The presence of LPS in adipose tissue has shown to trigger inflammation and has been linked to the development of insulin resistance and other metabolic abnormalities.<sup>12</sup>
- In another study, *B. lactis* 420 protected against NSAID-induced GI side effects in a rat model by reducing an NSAID-induced increase in stomach permeability.<sup>5</sup>
- *B. lactis* 420 reduced mucosal dysbiosis, bacterial translocation, and expression of major pro-inflammatory cytokines in various tissues, and also improved glucose metabolism in mice fed a HFD.<sup>3</sup>
- In diabetic mice, *B. lactis* 420 enhanced concentrations of ileum GLP-1, a protein involved in both insulin secretion and satiety signaling.<sup>6</sup>

### Limitations

A majority of these are preclinical studies; therefore, further clinical investigation is warranted to determine if duplication and correlations observed in animal models hold true for human studies.

### Conclusion

The probiotic strain *B. lactis* 420 has been shown in a human clinical study to positively influence body weight and body fat regulation and may be particularly beneficial for long-term body weight and fat maintenance. The gut microbiome is a key factor involved in the complex regulation of body weight and fat maintenance. Targeted probiotic interventions represent another tool that may be integrated into diet and lifestyle management programs.

### References

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