

Important notes:

Do **NOT** write outside the grey boxes. Any text or images outside the boxes **will** be deleted.

Do **NOT** alter the structure of this form. Simply enter your information into the boxes. The form will be automatically processed – if you alter its structure your submission will not be processed correctly.

Do not include keywords – you can add them when you submit the abstract online.

Title:

Preferential utilization of plant polysaccharides by obesity-depleted *Bacteroides*: a species-resolved profiling

Authors & affiliations:

Kayeon Ko^{1,2}, Yunpeng Wang^{2,3}, Guiguo Zhang^{2,3}, Yunkyoung Lee^{1,2}

¹ Department of Food Science and Nutrition, Jeju National University, Republic of Korea

² China-South Korea International Joint Laboratory of Functional Polysaccharides in Shandong Province, China

³ Department of Animal Nutrition, Shandong Agricultural University, China

Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word **ONLY** (place names excluded). No full stop at the end.

2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract

Methods: Describe your selection of observations or experimental subjects clearly

Results: Present your results in a logical sequence

Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

Introduction: Human gut *Bacteroides* are pivotal saccharolytic residents that influence health and disease, from colonization resistance to treatment responses. They metabolize endogenous glycans and plant-derived polysaccharides, thereby supplying nutrients and vitamin intermediates to the host and other intestinal microbes. Emerging evidence indicates that polysaccharides from edible and medicinal plants reshape the growth and metabolic profiles of *Bacteroides*. Given consistent reports that several *Bacteroides* taxa are reduced in obesity and associated with low-grade inflammation and metabolic dysregulation, we prioritized obesity-depleted lineages, namely *B. uniformis*, *B. thetaiotaomicron*, and *B. ovatus*.

Methods: We examined species-level utilization of 12 plant-derived polysaccharides under anaerobic culture in *Bacteroides* minimal medium at 0.5% (w/v), with no-carbon and glucose controls. The test set comprised seven seaweed-derived polysaccharides, two jujube polysaccharides, and three inulin-type fructans. Growth (OD600), carbohydrate consumption, pH, and titratable acidity were measured over 48 h and were collectively used to evaluate fermentation activity.

Results: At 48 h, inulin-type fructans consistently supported strong fermentation across all three species, with *B. uniformis* responding most strongly to *Helianthus tuberosus* polysaccharides, *B. thetaiotaomicron* showing higher activity on medium-chain inulin, and *B. ovatus* exhibiting moderate yet broadly distributed activity with a comparatively stronger response to jujube polysaccharides. By contrast, seaweed-derived polysaccharides induced small baseline-referenced changes. Notably, responses differed among inulin-type fructans, suggesting sensitivity to fructan chain features such as degree of polymerization, branching, and terminal linkages.

Discussion: Obesity-depleted *Bacteroides* exhibit both conserved and species-specific strategies of polysaccharide use. Inulin-type fructans consistently supported strong fermentation in all three *Bacteroides* species, while jujube polysaccharides elicited comparatively stronger activity in *B. ovatus*, and seaweed-derived polysaccharides were generally modest. These results provide functional guidance for species-specific enrichment using dietary polysaccharides. Further studies are needed to determine the relationship between polysaccharide structural features, including those of inulin-type fructans, and species-level substrate utilization.