Lactobacillus plantarum WJL improves mouse juvenile growth kinetics upon chronic undernutrition in bacteria strain-specific manner

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Objectives: Childhood undernutrition is a global health challenge. Gut microbiota plays an active role in disease aetiology. Microbiotherapy based on selected strains has been suggested as a promising strategy for undernutrition treatment.
Methods: Conventional C57BL6 male mice were weaned at 21 days after birth and bred on a standard or an experimental (isocaloric, hypoprotidic and hypolipidic) diet until young adulthood (day 56). Mice on experimental diet received daily *Lactiplantibacillus plantarum* WJL (LpWJL), *L. plantarum* NIZO2877 (LpNIZO) or placebo oral supplementation.

Results: At D56, mice fed with the experimental diet were smaller than the standard diet group (7.7 vs 8.9 cm; $p< 0.01$) with significantly lower hepatic levels of IGF-1 as well as lower circulating IGF-1 levels in sera. Supplementation with LpWJL increased body length (8.02±0.19 vs 7.73±0.16 cm; $p<0.0001$) and weight of mice fed experimental diet compared to the placebo supplementation. LpWJL-treated mice showed 23% increase in daily growth weight and length gain compared to placebo without the change in the mean daily food intake. In the LpWJL group, mice had higher hepatic IGF-1 levels (108±12.5 vs 59.8±18.5 pg/mg tissues; $p< 0.0001$) and higher plasmatic IGF-1 levels (209±51 vs 148±32 ng/mL; $p< 0.001$) compared to the placebo group. This was accompanied by higher insulin levels (0.49 vs 0.26 ng/ml; $p< 0.05$) and significantly improved glucose clearance after intraperitoneal glucose injection. Mouse fed the LpNIZO showed no increase in body length or weight and their IGF-1 and insulin levels were not different compared to the placebo group.

Conclusion: Oral supplementation with LpWJL increases the production and levels of IGF-1, levels of insulin and improves the growth kinetics of conventional juvenile mice upon undernutrition. This effect is bacteria strain specific. Our results show that microbiotherapy with validated strains has the potential to alleviate long-term adverse outcomes of chronic undernutrition.

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