Chitin-Glucan Supplementation Altered Gut Microbiota and Improved Postprandial Metabolism in Subjects at Cardiometabolic Risk

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Objectives: In this exploratory study, we aimed at characterizing the impact of chitin-glucan (CG), an insoluble dietary fiber, on gut microbiota composition and functions as well as on the cardiometabolic profile in subjects at cardiometabolic risk.

Methods: Fifteen subjects were included in this double-blind, randomized, twice 3-week cross-over study and consumed 4.5g of CG or maltodextrin (control) as a supplement daily. Before and after the intervention phases, fasting and postprandial metabolic parameters and exhaled gases (hydrogen [H_2] and methane [CH_4]) were evaluated. Gut microbiota composition (16S next generation sequencing), fecal concentrations of bile acids, long- and short-chain fatty acids (LCFA, SCFA), zonulin, calprotectin and lipopolysaccharide binding protein (LBP) were analyzed.

Results: Compared to control, CG supplementation increased exhaled H_2 following an enriched-fiber breakfast ingestion and decreased postprandial glycemia and triglyceridemia response to a standardized test meal challenge served at lunch. Of note, the decrease in postprandial glycemia was only observed in subjects with higher exhaled H_2, assessed upon lactulose breath test performed at inclusion. CG decreased a family belonging to Actinobacteria phylum and increased 3 bacterial taxa: *Erysipelotrichaceae* UCG.003, *Ruminococcaceae* UCG.005 and *Eubacterium ventriosum group*. Fecal metabolites, inflammatory and intestinal permeability markers did not differ between groups.

Conclusions: We showed that CG supplementation modified the gut microbiota composition and improved postprandial glycemic response, an early determinant of cardiometabolic risk. Our results also suggest breath H2 production as a non-invasive parameter of interest for predicting the effectiveness of dietary fiber intervention.

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