Effects of corn resistant starch on metabolic syndrome and gut microbiota in high-fat diet-induced obese mice

Wei-Han Lai [1], His-Mei Lai [2], Yu-Hsin Chen [3] and Cheng Huang [1]

Abstract

Resistant starch, a type of dietary fiber, not only ameliorates obesity but also promotes production of short-chain fatty acid (SCFAs) and growth of beneficial gut microbes. To determine the bioactivity of corn resistant starch (CRS) in diet-induced obesity, mice were fed a normal diet (ND), or a high-fat diet (HFD) with or without CRS in this study. We demonstrated that CRS intervention mitigated HFD-induced body weight gain and adipocyte hypertrophy, 20% CRS in particular; meanwhile, obesity-related physiological indices, including dyslipidemia, hepatic steatosis, insulin resistance and impaired glucose tolerance, were improved after CRS intervention. Moreover, CRS intervention alleviated the extent of inflammation in epididymal white adipose tissues and liver tissues, as opposed to those fed an HFD. On the other hand, CRS intervention reverted the gut microbiota composition disrupted by HFD feeding, with an increase in Bacteroidetes and a decrease in Firmicutes. Using 16S rRNA gene sequencing of fecal samples, we observed the relative abundances of *Muribaculaceae* increased significantly after CRS intervention, along with increased SCFA concentrations, correlated with its role in production of SCFAs; meanwhile, endogenous probiotics *Lactobacillaceae* and *Bifidobacteriaceae* were raised, compared to HFD feeding alone. Taken together, the bioactivity of CRS in diet-induced obesity includes averting the progression of obesity-related metabolic disorders and reshaping the gut microbiota composition to a state before HFD feeding. The resulting data demonstrated the potential of CRS to be developed as a type of prebiotics and functional foods.

Keywords:metabolic syndrome; corn resistant starch; gut microbiota

[1] Department of Biotechnology and Laboratory Science in Medicine, National Yang-Ming University
[2] Department of Agricultural Chemistry, National Taiwan University
[3] Taichung District Agricultural Research and Extension Station, Council of Agriculture, Executive Yuan