

Potential of novel dextran oligosaccharides as prebiotics for obesity management through in vitro experimentation

Abstract

The energy-salvaging capacity of the gut microbiota from dietary ingredients has been proposed as a contributing factor for the development of obesity. This knowledge generated interest in the use of non-digestible dietary ingredients such as prebiotics to manipulate host energy homeostasis. In the present study, the in vitro response of obese human faecal microbiota to novel oligosaccharides was investigated. Dextrans of various molecular weights and degrees of branching were fermented with the faecal microbiota of healthy obese adults in pH-controlled batch cultures. Changes in bacterial populations were monitored using fluorescent in situ hybridisation and SCFA concentrations were analysed by HPLC. The rate of gas production and total volume of gas produced were also determined. In general, the novel dextrans and inulin increased the counts of bifidobacteria. Some of the dextrans were able to alter the composition of the obese human microbiota by increasing the counts of *Bacteroides-Prevotella* and decreasing those of *Faecalibacterium prausnitzii* and *Ruminococcus bromii/R. flavefaciens*. Considerable increases in SCFA concentrations were observed in response to all substrates. Gas production rates were similar during the fermentation of all dextrans, but significantly lower than those during the fermentation of inulin. Lower total gas production and shorter time to attain maximal gas production were observed during the fermentation of the linear 1 kDa dextran than during the fermentation of the other dextrans. The efficacy of bifidobacteria to ferment dextrans relied on the molecular weight and not on the degree of branching. In conclusion, there are no differences in the profiles between the obese and lean human faecal fermentations of dextrans.

Keyword: Dextrans; Prebiotics; Obesity; Gut microbiota; SCFA