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Glucose fermentation does not impact on in vitro bacterial metabolism of hesperidin

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Hesperidin (hesperetin-7-*O*-rutinoside) represents more than 90% of the flavanones in orange and orange juice. Flavanones have a variety of potential biological effects including antioxidant and anti-inflammatory actions. Hesperidin (HesD) bioavailability is poor, and it is hydrolysed to the aglycone hesperetin (HesT) and then metabolised by gut bacteria to phenolic acids. Most bacterial metabolism studies incubate the flavonoids alone with pure cultures of bacteria or human faeces, and do not provide a carbohydrate source for the bacteria. However, dietary fibre and other fermentable carbohydrates are most often eaten as part of the same diet and it is likely that carbohydrate and flavanones will be metabolised at the same time in the human colon. Thus it is important to understand the impact of carbohydrate fermentation on the colonic metabolism of flavanones such as hesperidin.

In vitro fementations[1] using faecal bacteria from 6 healthy Caucasian volunteers were used to explore the metabolism of HesD (10 mg/50 ml) and the effect of glucose (0·5 g/50 ml) on the disappearance of HesD, appearance of HesT and production of phenolic acids. Volunteers followed a low polyphenolic diet for 2 days before providing faecal samples. In vitro 24 h fermentations were carried out and samples taken at 0, 2, 4, 6, and 24 h. For each sample, pH was measured and HesD and HesT were detected with HPLC-PDA. Phenolic acid production was measured by GC-MS[2]. The antioxidant capacity of the fermentation fluid was measured with the FRAP assay[3].

There was no effect of glucose on the concentrations of HesD, HesT, and phenolic acids during in vitro fermentation with gut bacteria (Fig. 1a) nor was there any difference in antioxidant capacity. However, it was clear that glucose fermentation had resulted in a significant decrease in pH (Fig Fig. 1b. $p < 0{\cdot}05$).

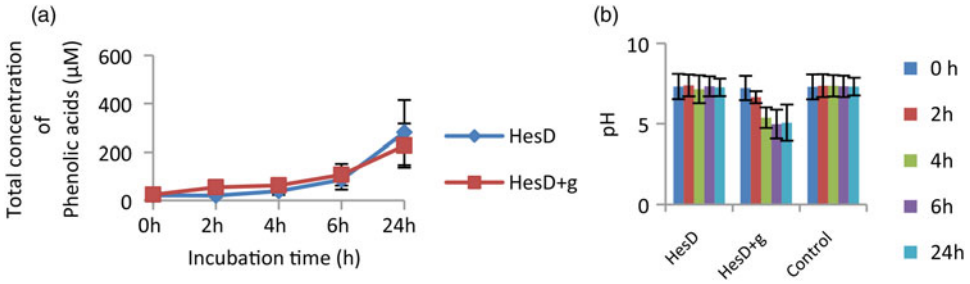

Fig. 1. Sum of phenolic acids from hesperidin and culture pH during incubation with faecal bacteria in vitro

In conclusion, carbohydrate fermentation does not affect HesD metabolism by colonic bacteria, however this should be confirmed with other sources of fermentable carbohydrate.

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3. Benzie IFF, Strain J *et al.* (1996) *J Analyt Biochem* **239**, 70–76.