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# Changes in human colonic bacteria production of phenolic acids from rutin in the presence of different dietary fibres

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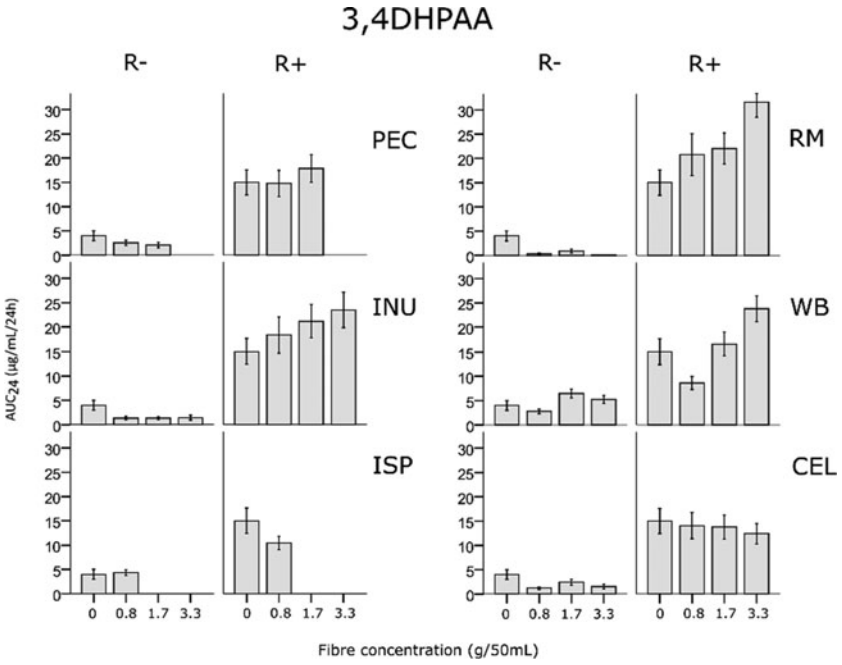
Dietary polyphenolics have been linked to a range of systemic effects, which may, in part, be attributable to their colonic bacterial metabolites. Both the gut bacteria and food matrix (e.g. dietary fibre alongside polyphenolics) may be important factors in the variability in human responses to polyphenolic-rich foods(1). Quercetin is a commonly consumed dietary flavonol found in onions, with limited bioavailability. Specific glycosides of quercetin, e.g. quercetin-3-O-rutinoside (rutin), escape intestinal absorption and are catabolised by the gut microbiota to a range of phenolic acids(2). Little is known about the interactions between polyphenolics / quercetin and dietary fibres commonly occuring in foods - or the impact of such interaction on the colonic production of phenolic acids with demonstrated bioactivity (2).

Dietary fibres (inulin, pectin, psyllium, pyrodextrin, wheat bran and cellulose, 0.8, 1.7 and 3.3 g/50mL fermentation fluid) were fermented *in vitro* with human faeces (n = 10) in the presence or absence of rutin (1 mg/50mL). Twenty eight potential phenolic metabolites were analysed by GC-MS and short chain fatty acids by GC-FID. Results were confirmed by fermentation of 13C labelled quercetin.

3,4-Dihydroxyphenylacetic acid, 3-hydroxyphenylacetic acid, 3-(3 hydroxyphenyl) propionic acid and 3-(3,4-dihydroxyphenyl)propionic acid were identified as metabolites, with 3,4-dihydroxyphenylacetic the most characteristic. Addition of inulin, wheat bran or pyrodextrin changed the amount and rate of breakdown of 3,4-dihydroxyphenylacetic acid over 24 h ($P < 0.05$). Several phenolic metabolites were not specific to rutin, but resulted from fibre fermentation. Rutin had a minimal impact on pH and short chain fatty acid production.




Faecal bacterial production of 3,4DHPAA with rutin (R+, 20 µg/mL) and without rutin (R-) in presence of fibre at four concentrations (0, 0.8,1.7 and 3.3 g/50mL) over 24 hours (areas under the curve); INU, inulin, PEC, pectin, ISP, psyllium, RM, pyrodextrin, WB, wheat bran, CEL, cellulose; means ± S.E.M.

Fermentable fibres impacted on the bacterial catabolism of rutin and also significantly contributed to the colonic pool of phenolic acids. Inter-individual variations between individual donor's capacity to ferment rutin and fibers warrant further investigation.

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2. Jaganath IB, Mullen W, Edwards CA, Crozier A. *Free rad res.* 2006 Jan 1;**40**(10):1035–46.