Proceedings of the Nutrition Society (2012), **71 (OCE2)**, E60 doi:10.1017/S0029665112001176

Summer Meeting hosted by the Irish Section, 16–19 July 2012, Translational nutrition: integrating research, practice and policy

The effect of ageing on the colonic bacterial metabolism of dietary polyphenols

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Dietary polyphenols have properties which could counteract some of the impact of ageing and risk of chronic diseases including cancer[1]. The bioavailability and metabolism of many polyphenolic compounds have been established in young adults but little is known about their colonic bacterial metabolism of polyphenols in older people. A minority of the polyphenols are metabolised in the small intestine before absorption; the majority remain in the gut lumen where they are further degraded and modified by the colonic bacteria[2]. The function of the gut and the composition of the colonic microbiota have been shown to change during ageing[3], which may affect the colonic metabolism of polyphenols and modulate the range of phenolic metabolites formed, which are proposed to exert beneficial effects different from their parent compounds. The aim of this study was to understand the colonic metabolism of polyphenols in older adults.

Healthy participants aged 54–75 ($n = 11$) or 23–43 ($n = 8$) followed first a 3-day low then a 3-day high-polyphenol diet (~1500 mg flavonoids/day). Weighed dietary records and a food frequency questionnaire (FFQ) focusing on polyphenol-rich foods were used. Biological samples (urine, faeces) were collected at the end of each diet. Urinary phenolic acids were measured by gas chromatography–mass spectrometry and faecal short chain fatty acids (SCFA) by gas chromatography with flame ionization detector; faecal pH was also measured in fresh samples. Difference within groups were tested with the Wilcoxon sign rank test, and differences between groups with the Mann-Witney U-test.

We observed a significant ($p<0.01$) increase in the urinary excretion of total phenolic acids after the high-polyphenol diet from 7.7 (SD 5.7) to 23.4 (SD 31.7) μg/day in the older age group (Δ 15.71 g/day, SD 31.85) and from 50 (SD 21.2) to 227.4 (SD 72.3) μg/day in younger age group (Δ 117.3 g/day, SD 64.9). The difference in phenolic acid excretion between the two groups was significant, and could not be explained by variations in polyphenol-rich food intake (according to food diaries). Faecal pH was significantly ($p<0.01$) reduced after the high polyphenol diet in both groups: from 7.6 (SD 0.5) to 7.1 (SD 0.5) in the older group and from 7.2 (SD 0.4) to 6.5 (SD 0.9) in the younger group; no significant difference was observed between groups.

Changes in SCFA production after the high polyphenols diet were not significant for the older group (228.2 *vs.* 260.4 μmoles/g, SD 82.2 and 66.6 respectively) or the younger group (172.0 *vs.* 168, SD 100.9 and 82.4, respectively).

The variation in polyphenol metabolism between older and adult participants may be related to the effect of aging on colonic bacterial metabolism and should be taken in consideration when exploring the health promoting potential of polyphenolic compounds and other fermentable foods.

This work was supported by the Faculty of Applied Medical Sciences – Clinical Nutrition Department, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia 2010–1012, and Tenovus Scotland.

1. Manach C, Williamson G, Morand C *et al.* (2005) *Am J Clin Nutr* **81**, 230–242.
2. Mueller S, Saunier K, Hanisch C *et al.* (2006) *Appl Environ Microbiol* **72**, 1027–1033.
3. Tiihonen K, Ouwehand A, Rautonen N *et al.* (2010) *Ageing Res Rev* **9**, 107–116.