

Winter Meeting, 15 December 2009, Food supply and quality in a climate-changed world

Anthocyanin-rich berry-extract treatment decreases expression of dietary glucose transporter genes in human intestinal Caco-2 cells

F. Alzaid¹, K. Pourvali¹, P. A. Sharp¹, D. Bagchi², V. R. Preedy¹ and H. Wiseman¹

¹Nutritional Sciences Division, King's College London, Franklin-Wilkins Building, 150 Stamford Street, London SE1 9NH, UK and ²Department of Pharmacological and Pharmaceutical Sciences, University of Houston College of Pharmacy, Houston, TX 77204, USA

Berries are a rich source of polyphenolic compounds such as flavonoids, including anthocyanins, with wide-ranging potential therapeutic effects⁽¹⁾. It has been demonstrated previously that intestinal uptake of dietary glucose is impeded by the presence of polyphenolic compounds; however, little is known regarding the genes involved in this mechanism⁽²⁾. The aim of this study was to investigate the effects of an anthocyanin-rich berry-extract on dietary glucose transporting genes in Caco-2 cells.

Human intestinal Caco-2 cells were cultured for 19 d and were then treated for 16 h with an anthocyanin-rich berry-extract (OptiBerry; InterHealth Nutraceuticals, Benicia, CA, USA) at a final concentration of 0.5% (w/v). Subsequently mRNA was isolated and used for the quantitative real-time polymerase chain reaction (qRT-PCR), using 18S and GAPDH as housekeeping genes. Gene expression data are expressed as means (\pm SEM) relative expression ratios of control; $n = 5/6$.

The expression of GLUT2 (apical/basolateral monosaccharide transporter), GLUT5 (apical fructose transporter) and SGLT1 (apical sodium/glucose co-transporter) was decreased by the berry-extract treatment. GLUT2, GLUT5 and SGLT1 expression as a ratio of the control was as follows: GLUT2 (0.20 ± 0.02 ; $P = 1.9 \times 10^{-4}$), GLUT5 (0.57 ± 0.08 ; $P = 2.5 \times 10^{-3}$) and SGLT1 (0.45 ± 0.03 ; $P = 3.1 \times 10^{-2}$).

GLUT2, GLUT5 and SGLT1 have previously been identified as therapeutic targets for dysregulated glucose metabolism. In this study, the expression of these genes in Caco-2 cells was decreased by treatment with an anthocyanin-rich berry-extract. Studies are in progress to investigate the biological relevance of the observed effects in relation to berry consumption and the absorption of dietary sugar.

1. Zafra-Stone S, Yasmin T, Bagchi M *et al.* (2007) *Mol Nutr Food Res* **51**, 675–683.

2. Kwon O, Eck P, Chen S *et al.* (2007) *FASEB J* **21**, 366–377.