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Flavonoid-rich berry-extract influences expression of genes in the iron-uptake pathway in human intestinal Caco-2 cells

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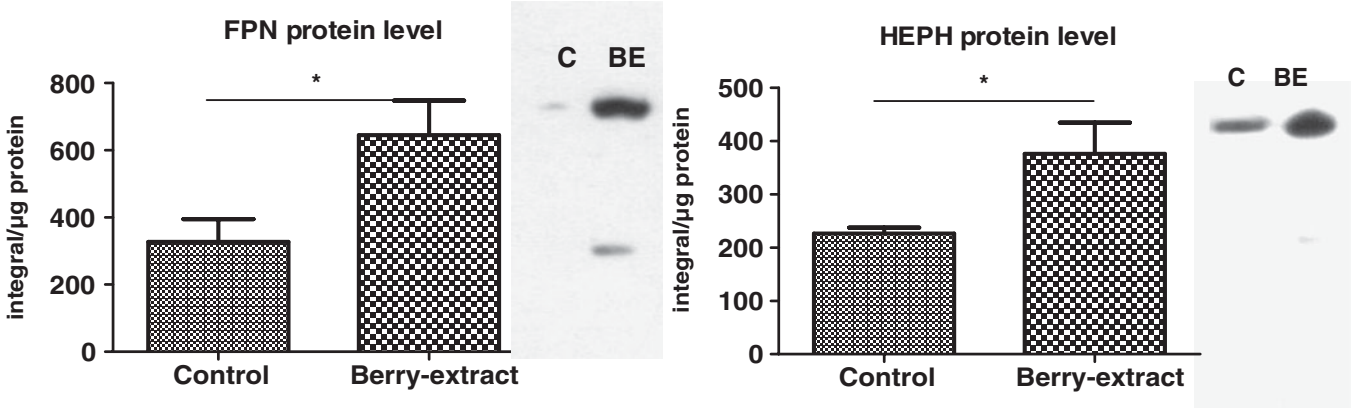
Berries are a rich dietary source of bioactive polyphenols, including flavonoids, such as anthocyanins[1]. Dietary flavonoids are known to impair Fe absorption and reduce non-haem-Fe transport across Caco-2 cell monolayers[2]. Previously, we demonstrated that a flavonoid-rich berry-extract decreases the expression of the divalent metal ion transporter (DMT1) and the haemochromatosis (HFE) genes, involved in the Fe-uptake pathway[3]. The present study investigated the influence of this berry-extract on the gene expression and corresponding protein abundance of the apical ferrireductase, duodenal cytochrome B (DCYTB), the basolateral Fe efflux protein, ferroportin (FPN), the basolateral ferroxidase, hephaestin (HEPH) and DMT1 and HFE, which co-ordinate intestinal Fe transport[4].

Human intestinal Caco-2 cells, cultured for 21 d, were then treated for 16 h with an anthocyanin-rich berry-extract (OptiBerry; Inter-Health Nutraceuticals, Benicia, CA, USA) at a final concentration of 0.5 % (w/v). RNA and protein were isolated for quantitative RT–PCR and western blotting, respectively. All gene expression data were normalised to 18S and GAPDH as housekeeping genes and presented as mean normalised expression ratio and SEM. All protein quantity data were normalised per μg of protein and presented as mean integral/¶g protein and SEM. Statistical significance was determined by Student's unpaired *t*-test with significance indicated at $P \leq 0.05$.

Following treatment with the berry-extract, there were significant decreases in DMT1 (mean 0.63 (SEM 0.07), $p \leq 0.039$, n 6) and HFE (mean 0.52 (SEM 0.05), $P \leq 0.0001$, n 6) mRNA expression. The abundance of the proteins HEPH and FPN, involved in the basolateral release of Fe, was significantly increased (Fig. 1).

These results indicate that berry-flavonoids influence the expression of components of the Fe-uptake pathway. Studies are in progress to investigate the biological relevance of the observed effects in relation to berry consumption and the bioavailability of dietary Fe.



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