P05

Effect of resveratrol and carbohydrate restriction on pituitary function and ageing

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Background – Caloric restriction (CR) is shown to extend lifespan in mammals and is a well known intervention that improves endogenous Growth Hormone (GH) secretion. GH plays an important regulatory role in metabolism and its secretion declines with age. Low glycemic index (GI) diets and resveratrol supplementation have been reported to decrease the appearance of age-related pathologies and influence pituitary GH activity. GH plays an important regulatory role in metabolism and its secretion declines with age. Rat pituitary adenoma GH3 cells were used as an in vitro model to examine the effect of low GI carbohydrate and resveratrol on the GH synthesis.

Objective – To determine the effects of low GI carbohydrate and resveratrol on pituitary GH production. Through the use of a pituitary GH3 cell culture system to we hope to gain insight on how low GI carbohydrate and resveratrol stimulate GH production.

Design – GH3 cells with the seeding density of $3 \times 10^5$ were grown in glucose (high GI) or fructose (low GI) media or glucose media ± resveratrol (10mg/L) or fructose media ± resveratrol (10mg/L). Viable cell count, growth rates and doubling time were measured. The level of GH gene expression was examined using RT PCR and expressed as arbitrary units (AU).

Outcomes – After 78 hours cells grown on fructose + resveratrol media exhibited diminished growth rates ($5.7 \times 10^5$ cells) compared to glucose based media ($7.5 \times 10^5$ cells), $p<0.05$. In contrast cells grown in fructose rich media (21.9 AU), resveratrol + fructose media (99.7 AU) and glucose + resveratrol media (15.3 AU) showed a significant increase in GH expression compared to the cells grown in glucose media (3.7 AU) $P<0.05$.

Conclusions – Low GI carbohydrate and resveratrol slow cell growth while stimulating GH gene expression in cultured pituitary cells. These results indicate that a low GI diet and resveratrol supplementation may enhance GH secretion in this in mammals and if this was to occur in vivo possibly lead to the life span extension.

P06

FODMAPs are substrates for colonic fermentation:
possible implications for gastrointestinal health

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Background – FODMAPs (Fermentable Oligo-, Di-, Mono-saccharides And Polyols) are a newly described group of poorly absorbed, short-chain carbohydrates and include; fructose, lactose (in hyperlactasic people), fructans (inulin and fructooligosaccharides (FOS)), galactooligosaccharides (GOS) stachyose and raffinose) and sugar alcohols (sorbitol and mannitol). FODMAPs are commonly found in a wide variety of foods including garlic, onions, rye, legumes, stone fruits, fruit juices and products made with high fructose corn syrup. Malabsorbed FODMAPs act as substrates for bacterial activity in the gastrointestinal tract producing gases (CO$_2$, CH$_4$, H$_2$) and short chain fatty acids (SCFA). Some FODMAPs, i.e. FOS and GOS are prebiotic in nature. We have established analytical methods (HPLC and enzymatic) to quantify levels of FODMAPs in foods, and have developed 2 diets that vary greatly in FODMAP composition.

Objectives – To measure the short-term effects of 2 diets that differ in FODMAP content on colonic fermentation and gastrointestinal symptoms in healthy people.

Design - 15 healthy people were randomised to 2 diets that differed only in the quantity of FODMAPs (low and high FODMAP). The diets were consumed for 2 days each separated by at least one week. All food was provided. Hourly breath hydrogen samples were collected for 14 hours on day 2 of each diet and symptom questionnaires were completed.

Outcomes – The high FODMAP diet significantly increased breath hydrogen production (over 4 fold, $P<0.01$) and produced more wind and looser stools ($P<0.02$) when compared with the low FODMAP diet.

Conclusions – The results suggest that foods containing FODMAPs provide carbohydrate substrate for colonic fermentation. FODMAPs may have a number of important implications for the health of the gut and for controlling undesirable symptoms in individuals with gastrointestinal disorders such as Irritable Bowel Syndrome.