

Concurrent Session 14

Green tea supplementation in high fat fed Sprague-Dawley rats has no effect on gene transcripts relating to muscle metabolism

E Hinch¹, N Chen^{2,3}, ML Mathai², KA Carey⁴, D Cameron-Smith⁴, HS Weisinger³, AJ Sinclair⁵, RS Weisinger⁶, P Lewandowski¹

¹Biomedical Sciences, Victoria University, Vic 8001; ²Howard Florey Institute of Experimental Physiology and Medicine, University of Melbourne, Vic 3010; ³Department of Optometry and Vision Sciences, University of Melbourne, Vic 3053

⁴School of Exercise and Nutrition Sciences, Deakin University, VIC 3127; ⁵Department of Food Science, Royal Melbourne Institute of Technology, Vic 3000; ⁶School of Psychological Science, La Trobe University, Vic 3086

Background - Functional food ingredients beneficial for weight regulation are of considerable importance given the marked increase in obesity experienced throughout the world. Green tea has previously been found to lower body fat and improve fat distribution in both human and animal models.

Objectives - This study aimed to investigate the impact of green tea, green tea catechins or black tea supplementation on rodent skeletal muscle gene transcripts essential for energy metabolism and lipid homeostasis.

Design - Sprague-Dawley rats were fed a high fat diet and supplemented at 100% of their fluid intake from 4 weeks of age, with water as a control (n=7), green tea (n=7), epigallocatechin-3-gallate (EGCG) (n=7) or black tea (n=7) for a period of 6 months. Following this, mRNA levels of genes important in energy metabolism including; cytochrome c oxidase 3 and 4 (COX 3 & 4) and lipid homeostasis including; fatty acid transferase (FAT/CD36), peroxisomal proliferators activated receptor alpha (PPAR- α), uncoupling protein-3 (UCP-3), peroxisome proliferators activated-receptor gamma co activator 1alpha (PGC-1 α) and pyruvate dehydrogenase kinase isoenzyme 4 (PDK4) were measured by real-time PCR in quadriceps muscle samples.

Outcomes - There were no significance changes in mRNA expression of genes in groups supplemented with green tea, EGCG or black tea, this is despite a significant reduction in fat mass within the green tea and EGCG groups.

Conclusion - The supplements investigated did not elicit changes in the expression of genes essential for total oxidative and lipid metabolism in quadriceps muscle. This is despite the alterations in total adiposity evident following green tea and EGCG supplementation. Further analysis is required to evaluate the actions of green tea and catechins on other tissues, including adipocytes.

Cheddar cheese: a potential food carrier for the delivery of folic acid?

HS Madziva, K Kailsapathy, M Phillips

Centre for Advanced Food Research, University of Western Sydney, NSW 1797

Background - Fortification with folic acid in one or more of the commonly consumed dietary items is now regarded as the best method to ensure that increased folate intake reduces the risks associated with folate deficiency. No studies have been reported yet regarding Cheddar cheese fortification; although the concept of increasing folate levels in dairy products through "natural" synthesis using bacterial cultures has been explored elsewhere. World cheese consumption and Cheddar in particular, has grown by 15% since 1997 with the forecast set to increase further during the next decade. This makes Cheddar cheese an important food commodity and the subject of an international trade of substantial value.

Objective - To investigate the possible application of various food grade polymers to encapsulate folic acid for use in Cheddar cheese manufacturing as an alternative medium for delivery of the vitamin.

Design - Edible gums were evaluated for folic acid encapsulation efficiency as single and mixed polymers. They were tested for their stability in a milk system where pH was adjusted from 6.7 to 4.5 over a 4 hr period. Stress tolerance was studied under simulated cheese press pressures for 4 h until a force of 84.3 g/cm² was detected. Cheddar cheese with and without capsules was made to evaluate the effectiveness of microencapsulation during the process and cheese ripening.

Outcomes - Alginate and pectin yielded the highest encapsulation efficiencies, 54 and 49% respectively. Upon being combined and the encapsulation conditions optimised, the alginate – pectin (alg-pect) mixture resulted in about 90% encapsulation efficiency. Folic acid retention under the test conditions was 100% indicating the capsules ability to remain intact in a milk system, to tolerate stress and protect folic acid during 9 months of ripening.

Conclusions - The combination of alginate and pectin polymers resulted in capsules with high encapsulation efficiency, notable stability in a milk system, significantly improved stress tolerance properties as seen by high folic acid retention during cheese pressing. Encapsulated folic acid has excellent stability in capsules during cheese ripening than free folic acid. These results suggest that Cheddar cheese can be an effective medium for folic acid delivery particularly if alginate-pectin capsules are used.