OMICS Group Conferences
Accelerating Scientific Discovery

International Conference on
Animal & Dairy Sciences

July 23-24, 2013 Embassy Suites Las Vegas, NV, USA

Effects of c9, t11- and t10, c12- conjugated linoleic acid on 3T3-L1 adipose cell culture: Novel fatty acid metabolites and lipogenic gene expression

T. D. Turner[1,2], W. J. Meadus[1], P. D. Duff[1], D. C. Rolland[1], C. Mapiye[1], J. Church[2] and M. E. R. Dugan[1]
[1]Agriculture & Agri-Food Canada, Canada
[2]Thompson River University, Canada

Adipose tissue is an active regulatory tissue producing cytokines with immunomodulating effects that can be influenced by fatty acids (FA). Conjugated linoleic acid (CLA), with *c*9,*t*11-CLA being the predominant isomer in ruminant products, and t10c12-CLA largely of industrial origin, purportedly have substantial anti-arithrogenic, anticarcinogenic and anti-obesity effects. The fate of CLA's has not been investigated in adipose tissue, prompting investigations into effects on the FA profile. Mature 3T3-L1 cells were incubated with 70µM *c*9,*t*11-CLA, *t*10,*c*12-CLA or 18:2n-6. Gene expression (ΔΔCt) measured by rt-PCR at 48h and normalised to 18:2n-6 indicated both CLA isomers slightly increased PPARγ expression, which correspondingly induced a 1.7 and 2.4 fold increase in adipose FA binding protein (AFABP) expression for *c*9t11- and *t*10c12-CLA respectively. Expression of FA oxidase (Acox1) and leptin were increased more by *t*10,*c*12-CLA, corresponding to increased lipid mobilization and catabolism, whereas increased monocyte chemotactic protein (MCP-1) expression may be indicative of an inflammatory stress response to FA oxidation. Lipid profiles of cells harvested at 144h were analysed by GC-FID, and FA with conjugated bonds were separated and collected by Ag^+-HPLC then analysed by GC-MS-EI to identify novel metabolites. Cultures incubated with *c*9,*t*11-CLA and 18:2n-6 had similar lipid content, whereas *t*10,*c*12-CLA induced a two-fold reduction. Conjugated diene metabolites with 16-, and 20-carbons were identified for *c*9,*t*11-CLA, similar *t*10,*c*12-CLA metabolites were also present, along with a 14-carbon diene. Previously unreported conjugated trienes assumed to be *c*6,*c*9,*t*11/*c*6,*t*10,*c*12-18:3 and *c*8,*c*11,*t*13/*c*8*t*12*c*14-20:3 were identified. Possible secondary effects of CLA isomer metabolites on gene expression of adipocytes require further investigation.

Biography

T.D. Turner performed the work with AAFC on a Visiting Fellowship funded by the Alberta Livestock and Meat Agency (ALMA) and current post-doctoral work is funded by Thompson River University. His work has focused on animal nutrition and lipidomics towards the nutraceutical properties of animal products, including over 20 peer-reviewed publications.