

## Lipid Science & Technology

November 30 - December 02, 2015 San Francisco, USA

## Effects of beef *trans*-18:1 from conventional versus flax/hay fed cattle on global gene expression in HepG2 liver cells

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Dietary *trans* (*t*) fatty acids, particularly *t*-18:1 have been generally associated with increased risk of heart disease, principally through elevated plasma LDL cholesterol and reduced HDL- cholesterol. The objective of this study was to use a human liver cell line (HepG2) to elucidate hepatic response to *t*-18:1 isolated from beef fat of cattle fed a conventional barley-grain diet or a flaxseed supplemented grass hay-based diet. Beef fat was derivatized to fatty acid methyl esters (FAME), then *t*-18:1 isomers were isolated using silver ion solid phase extraction (Ag\*SPE). The *t*-18:1 from barley grain fed beef contained 70% *t*10-18:1, while the fraction from flaxseed fed beef in a grass-based diet contained *t*11-, *t*13- and *t*14-18:1 (19% *t*11 + 46% combined *t*13/*t*14). The *t*-18:1 FAME were saponified to free fatty acids which were then complexed to bovine serum albumin before added to cell cultures. HepG2 cells were incubated for 24h with 100 µM t-18:1 fractions or *c*9-18:1 as a control. Global gene expression was analyzed using PrimeView Human Gene Expression Array (Affymetrix, CA) covering more than 20,000 genes. Functional analyses revealed that *t*-18:1 from beef fed the conventional barley-grain diet upregulated genes involved in stress response (7 genes), apoptosis (21 genes), lipid and cholesterol syntheses (15 genes), while gene expression when culturing HepG2 cells with *t*-18:1 from grass hay/flaxseed fed beef was not different from *c*9-18:1. The adverse effects observed with *t*10-18:1 rich fraction from beef fed high-grain on hepatocytes is similar to what previously reported for *t*9-18:1, the predominant *trans* fatty acid in partially hydrogenated vegetable oils.

## **Biography**

Payam Vahmani completed his PhD in 2013 at Dalhousie University (Nova Scotia, Canada) under the advisement of Dr. Alan Fredeen and he then joined Dr. Mike Dugan's lab at the Lacombe Research Centre (Lacombe, AB, Canada) as an NSERC research fellow. His PhD research revolved around enriching long chain omega-3 fatty acids in milk and milk products through cow nutrition, and in Dr. Dugan's lab he's involved in studies to enrich omega-3's and their biohydrogenation products in beef, and testing health effects of these products in cell culture and disease models.

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