

# International Summit on Current Trends in Mass Spectrometry

July 13-15, 2015 New Orleans, USA

## Effect of intake of butter with different level of medium chain fatty acids and different types of milk proteins on the observed metabolites in human biofluids - Assessed by an untargeted metabolomics approach using LC- and GCQ-ToF

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The Metabolic Syndrome (MeS) is a clustering of components that reflect over nutrition, sedentary lifestyles and resultant obesity. MeS includes the clustering of abdominal obesity, insulin resistance, dyslipidemia and elevated blood pressure. The prevalence of the MeS is globally increasing to epidemic proportions and is associated with an approximate doubling of the cardiovascular disease risk and a 5-fold increased risk for type 2 diabetes. Observational studies suggest that dairy foods consumption may prevent the development of MeS and its related disorders; both whey and casein proteins stimulate insulin secretion and have the potential to improve tissue glucose uptake and suppress postprandial blood glucose. The milk protein effect on postprandial lipaemia and chronic dyslipidaemia is not well defined as studies have produced different findings. Although some studies show beneficial effects of milk fat especially rich in short- and medium-chain fatty acids on weight control, glucose and lipid metabolism, results are still conflicting. To gain further insight into the nutritional impact of milk protein and milk fat metabolomics is proposed as a pioneer approach. It may help to increase our understanding of the influence of milk components e.g. on MeS by the advent of comprehensive analysis of low-molecular-weight compounds (metabolites) present in complex samples such as human biofluids collected from an intervention study. Liquid chromatography- and gas chromatography-quadrupole time of flight mass spectrometry (LC-MS and GC-MS Q-ToF) untargeted metabolomics were applied to develop multivariate models to identify biomarkers related to the intake of milk lipids with high or low content of medium-chain saturated fatty acids (MCFA), and milk proteins (whey vs. caseins) on metabolic profile in 52 subjects with abdominal obesity. Serum (fasted and 240 min after meal) and urine (fasted and 360 min after meal) samples were collected before and after the 12-weeks randomized, controlled, parallel, iso-caloric dietary intervention. Participants were randomized to one of four groups according to the intervention diet; low amount of MCFA (L-MCFA) + Whey, high amount of MCFA (H-MCFA) + Whey, L-MCFA + Casein, H-MCFA + Casein. Using LC-MS Q-ToF on blood samples yield both post prandial and long term effects on the metabolic profile of blood. A clear separation in the metabolic profile was observed for the group with H-MCFA + Casein compared to the three other groups while no effect on the metabolomics profile in urine was observed. Using GC-MS Q-ToF we have found a separation of all four groups when analysing the long term effect on the metabolic profile in urine. By combining LC-MS Q-ToF with GC-MS Q-ToF data thus secured optimal analysis of more metabolites, which now are being identified and related to the intake of dairy products and their effect on obese individuals.

### Biography

Trine K Dalsgaard completed her Master in biotechnology at Aalborg University, Denmark. In 2007, she completed her PhD in Food Science at Aarhus University, Denmark. She has subsequently focused on both basic research and applied food science but with mass spectrometry and different spectroscopic method as main competences. She has more than 25 preview papers within food science and nutrition. She did Post doc training at The Heart Research Institute in Sydney and at NIH in North Carolina, respectively. She is currently appointed as an Associate Professor at the Department of Food Science at Aarhus University, Denmark where her research focuses on free radical- and protein chemistry and detection of metabolites.

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