**Student Travel Award Recipient**

# Commercial Bovine Milk Fat Globule Membrane Fractions-Variations Among Sources

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Milk Fat Globule Membrane (MFGM) is a glycosylated, protein embedded, phospholipid fraction which delivers triglycerides in milk. Commercial bovine sources have recently come to the market as a novel food ingredient. Considering that MFGM is a heterogenous mixture of fat, protein and carbohydrate it can be expected that variations among MFGM products exist. For this reason, our aim was to describe the composition of commercial MFGM samples through proteomic, western blotting and lipidomic analysis. Six bovine milk fractions represented as MFGM fractions or Phospholipid fractions were obtained from various commercial sources. For proteomic analysis, LC-MS/MS was performed in technical replicates on a Thermo Q-Exactive Plus mass spectrometer and protein identifications and intensities extracted with MaxQuant against the Uniprot Bos taurus reference proteome. Relative protein composition within samples as well as between samples was investigated. Various proteins that have been previously described as classical MFGM components were also quantified by western blot. Lipidomic analysis was performed with UPLC-high resolution mass spectrometry followed by peak extraction with the non-targeted peak detection tool XCMS and identification of lipids via LipidSearch. Across the 6 MFGM fractions tested, nearly a thousand proteins were identified with 364 of these having significantly different protein levels. One hundred and thirteen proteins were different by a fold change (fc) of 10 or greater, 14 by an fc of 50 and 2 by a fc of 100. Interestingly, one of the latter two proteins, Mucin 1, is considered a 'classical' MFGM protein. Alpha-lactalbumin, a dominant protein in bovine milk fractions, was not significantly different among the groups and this was confirmed by immunoblotting. A total of 393 lipid species were annotated across positive and negative ionization modes with the major classes detected being triglycerides, sphingomyelins and several phospholipids. Across all samples, triglycerides comprised at least 50% of total lipids, phosphatidylcholine and sphingomyelin were the second and third most abundant lipid class, respectively. This work demonstrates the heterogenous nature of various bovine milk fractions. This variation must be considered when describing potential functional benefits of these products.