

Comparison Between Human and Bovine Milk Metabolome at 2-weeks Postnatal

Dominick J. Lemas¹, [place holder for other authors]

¹ Department of Health Outcomes and Biomedical Informatics, College of Medicine, University of Florida

ABSTRACT

Objectives: Milk is an affordable, nutrient-rich food for infant growth and development, comprised of carbohydrates, fats, proteins, vitamins, minerals, and biologically active factors. During the first twelve months of life, human breast milk is the ideal nutrition source for healthy infants. After this development window, human breast milk is usually substituted with bovine whole milk for the sake of convenience. However, comparative investigation of the human and bovine milk metabolome from a similar lactation stage has not been extensively studied. The goal of this project is to interrogate the human and bovine milk metabolome at 2-weeks postnatal.

Methods: Human milk (n=10) was collected at 2-weeks postpartum as part of the Breastfeeding and Early Child Health (BEACH) study. Mothers enrolled in the BEACH study were recruited between 36-38 weeks of pregnancy and planned to exclusively breastfeed their infant for at least 2-months. Similarly, bovine milk (n=10) was collected 2-weeks postpartum from primiparous Holstein dairy cows. Briefly, starting at 36 weeks of gestation, dairy cattle were housed in sand-bedded, shaded barns with access to fans and water soakers and fed a common transition cow total mixed ration. After calving, cows were treated similarly and milked twice daily. Human and bovine milk metabolomics was completed using high-resolution mass spectrometry and data analysis. The analysis was implemented using a Nextflow-based metabolomics pipeline on high performance university cluster. MZmine mass-spectrometry software and Python were used for data processing and statistical analysis.

Results: In the analysis 716 metabolites were identified in human milk and bovine milk samples that exceeded background signal produced by the blank control samples. Principle component analysis demonstrated that human milk metabolites were different from bovine milk. Venn diagram shows 237 metabolites were existed only in bovine milk while 167 metabolites were existed only in human milk; 312 metabolites were present in both types of milk.

Conclusions: These results highlight bovine milk is different from human milk in terms of metabolites. It would be important to identify whether the metabolites that have more volume in bovine milk are harmful or not in order to improve its quality.

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Other requirements:

1. The abstract should be formatted using the headings Objectives, Methods, Results, Conclusions and Funding Sources.
2. Title should contain less than 150 characters (now we have 63 without counting spaces)
3. Conclusions should be 1 or 2 sentences.
4. Funding Sources should not include grant numbers, since this would impact the efficacy of a blinded abstract review process.