Investigating the effect of storage temperature and length on the cell viability and nutritional quality of breast milk

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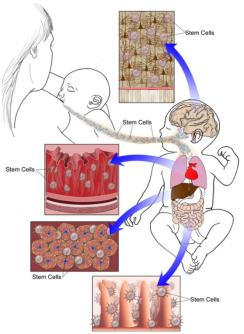
Integrated Concentration in Science

Background



Breast milk contains all of the bioactive components necessary for an infant's growth and development, including live cells like STEM and progenitor cells.

Infants born prematurely often have difficulty latching to the breast to feed, and so they are typically fed with breast milk that has been refrigerated or frozen.

Considering their increased susceptibility to infection and developmental issues, how do we ensure that breast milk is provided to premature infants at its peak quality?

Methods

Aim 1: Determine Changes in Cell Count & Viability

The Luna-FX7 Cell Counter uses dual fluorescent and bright-field detection to provide precise live and dead cell counts.

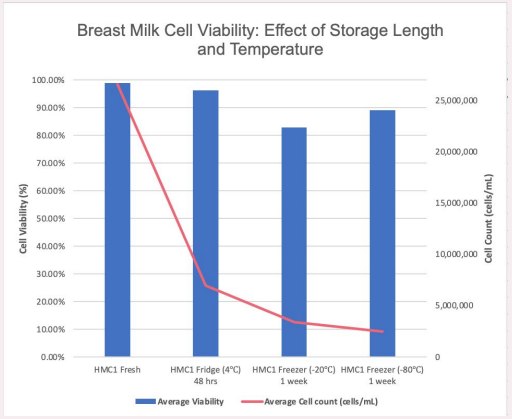
1. Suspend milk cells in PBS
2. Add AOPI dye to cell suspension to tag nucleated cells
3. Insert duplicate 10µL samples into the 2 chamber slides
4. Insert slide into the computer system to be analyzed

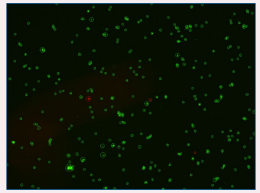
Aim 2: Assess Changes in Nutritional Quality

The MIRIS Human Milk Analyzer gives the energy, fat, carbohydrate, and protein content in human milk from just a small sample.

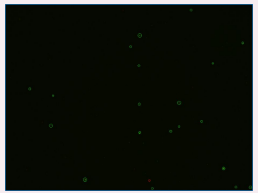
1. Heat 3mL of milk to 40°C in warmer
2. Homogenize milk for 1.5s/mL
3. Inject sample and run analysis

Results

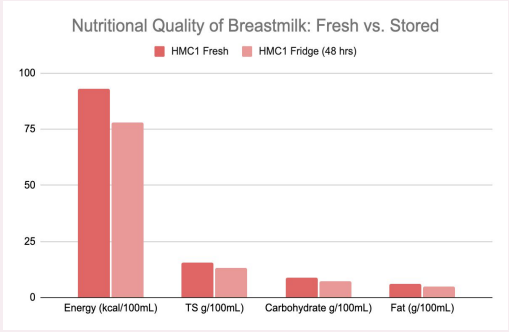




Fresh



Frozen 1 week (-80℃)



Although cell viability remains high (in the 85-90% range) the cell count decreased dramatically during storage.

Nutritional data was unable to be collected for the frozen samples, but in a 48 hour period in the fridge, macronutrient levels did drop slightly..

Going Forward

This study was a pilot for a much larger study that the Briere Human Milk Lab will be pursuing in the upcoming years.

The results of this study will be important in several contexts of neonatal care, including:

➔ Deepening our understanding of the quantity and types of cells present in breast milk, and how to best keep them alive.

➔ Advocating for better milk storage practices in the hospital.

Acknowledgements

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