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Impact of pasteurization and homogenization on the digestion of human milk: an in vivo study in the preterm infant

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Context
Ensuring adequate growth of preterm newborns remains a challenge. When breastfeeding not possible → pasteurized human milk from milk banks is preferentially administered. Holder pasteurization (62.5°C; 30 min) is applied for sanitary reasons but may reduce fat absorption through the inactivation of milk endogenous lipases. Conversely, homogenization of Holder-pasteurized human milk (PHM) may improve fat absorption and weight gain.

Objective
→ To investigate the impact of the homogenization and pasteurization of human milk on its gastric digestion in preterm infants

ClinicalTrials.gov
NCT02112331

Materials & Methods

Experimental design
Randomized controlled trial
Hospitalized tube-fed preterm infants (GA < 32 wks)
6-day experimental period; 2 independent groups

Human Milk
Gas and thin layer Titrimer analyzer chromatography
Indirect homogenization
Ultrasonication

Biochemical composition: kinetics of lipolysis and proteolysis

But did not impact gastric lipolysis
Lipolytic activity
Pre-lipolysis occurred prior to pasteurization in all milks and groups ranging between 2.2-4.0%. The global gastric lipolytic activity detected in fasted state averaged 17.5±2.9 U/ml/g at pH 4.5. Postprandial lipolytic activity increased with time and was higher after administration of Raw HM compared to Past HM (n=5) whereas it was not different after administration of Past HM vs. P+Homog HM (n=4)

Impact on digestive kinetics?

Results
Instantaneous lipolysis level

Homogenization reduced the meal emptying rate

% of ingested meal remaining in the stomach

Conclusion
The initial structure of HM modulated the hydrolysis kinetics (lipolysis and proteolysis) and the emulsion disintegration during the gastric digestion in preterm infants

Overall, in vivo data gathered here are crucial for a better understanding of milk neonatal digestion and help supporting the nutritional management of preterm infants