Comparaison of dynamic in vitro digestion of human milk vs standard infant formula to better understand their digestive kinetics

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**INTRODUCTION and OBJECTIVE**

Human milk (HM) is an optimal bioactive fluid, which meets infant requirement and is frequently substituted by infant formula (IF). These two infant diets are assumed to have different digestion kinetics although they are rarely directly compared. The present study aimed to evaluate the digestion kinetics and the structure evolution using the DIDGI® dynamic digestion system at the infant stage.

**METHODOLOGY**

- **In vitro digestion**
  - Human Milk: Pool of 50 raw milk samples
  - Lactation time: 1.8 - 2 months post-delivery
  - 1.0% true proteins, 2.8% lipids
  - Parameters based on literature (Roman et al. 2007; Bourlieu et al. 2014):
    - Gradual decrease of gastric pH → pH = 8 x 10⁻⁵ x time² - 0.031 x time + pH_intrinsic
    - Enzymes: Rabbit Gastric Extract + Porcine pancreatic. Bovine bile
    - Gastric emptying by Elashoff fitting (half-time emptying − T₁/₂ = 47 min; T₁/₂ = 78 min).
- **Infant formula**: NatiF basic IF powder (Yu et al. 2021)
  - Rehydrated at 1.4% true proteins, 3.2% lipids
  - Sampling times (min of digestion):
    - Diet (G0):
      - Gastric phase: G20, G40, G80, G120, G180
      - Intestinal phase: 120, 140, 180, 1120, 1180
  - *only for IF sampling

**RESULTS**

**Structure: Human milk**

- **Infant formula**
  - **Human milk**
  - **Infant formula**

**Proteolysis & Lipolysis:**

- **Caseins**
  - Representation corrected by meal dilution and emptying (Mean ± SEM)
- **Alpha-lactalbumin**
- **Proteolysis**
  - High lipolysis rate in raw HM prior to digestion due to endogenous lipase activity (10 %) → subtracted here for lipolysis rate during digestion
  - Lipolysis was not significantly different although it tended to be faster for IF during the early intestinal digestion phase.

**CONCLUSION**

Despite nutritional similarity, this study highlights that the influence of the matrix on the structure of the digesta and on the digestion kinetics and gives some further understanding to the global value of digestibility, such as determined in vivo.