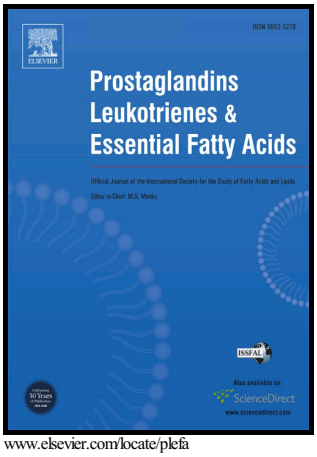
Importance of the regiospecific distribution of long-chain saturated fatty acids on gut comfort, fat and calcium absorption in infants

Valérie Petit, Laurence Sandoz, Clara L. Garcia-Rodenas



www.elsevier.com/locate/plefa

PII: S0952-3278(17)30012-1
DOI: http://dx.doi.org/10.1016/j.plefa.2017.05.007
Reference: YPLEF1830

To appear in: *Prostaglandins Leukotrienes and Essential Fatty Acids*

Received date: 6 January 2017
Revised date: 12 April 2017
Accepted date: 30 May 2017

Cite this article as: Valérie Petit, Laurence Sandoz and Clara L. Garcia-Rodenas Importance of the regiospecific distribution of long-chain saturated fatty acids o gut comfort, fat and calcium absorption in infants, *Prostaglandins Leukotriene and Essential Fatty Acids,* http://dx.doi.org/10.1016/j.plefa.2017.05.007

Importance of the regiospecific distribution of long-chain saturated fatty acids on gut comfort, fat and calcium absorption in infants

Valérie Petit*, Laurence Sandoz, Clara L. Garcia-Rodenas

Nestlé Research Center, Nestec Ltd., CH-1000 Lausanne, Switzerland;

valerie.petit@rdls.nestle.com

laurence.sandoz@rdls.nestle.com

clara.garcia@rdls.nestle.com

*Correspondance: Tel.: +41-21-785-9521

Abstract

Gastrointestinal tolerance and fat and calcium (Ca) absorption are different between breast-fed (BF) and formula-fed (FF) infants. Certain components and/or structural particularities in human milk (HM), can contribute to favorable outcomes in BF infants. In HM, the long-chain saturated fatty acid (LCSFA) palmitic acid has a different stereospecific distribution (sn-2 position) compared to most infant formula (IF) (primarily sn-1, 3 positions), which may contribute to unfavorable outcomes. Evidence suggests palmitic acid is important in the formation of stool FA-mineral (or FA-Ca) soaps, associated with harder stools in FF infants. Partial replacement by structured palmitic acid-rich triacylglycerols (TAGs) promotes palmitic acid absorption. However, evidence for stool softening, improved fat absorption and reduced Ca excretion in stools is inconsistent. IFs with less palmitic acid can improve fat and Ca absorption, and stool consistency. The presence of other LCSFAs (myristic and stearic acids) in sn-1, 3 positions may also contribute to reduced absorption of fat and Ca, and stool hardness, in FF infants. Nevertheless, little attention has been given to modifying these other LCSFAs in IF. We review literature comparing the effect of HM and IF with different lipid compositions on stool patterns and/or fat and Ca absorption in healthy, term infants. Based on available data, we estimate a maximum level for sn-1, 3 LCSFAs of 13% of TAGs, under which fat and Ca absorption and stool consistency are improved. IF designed according to this threshold could efficiently improve nutrient absorption and stool patterns in healthy infants who cannot be breast-fed.

Keywords: breastfeeding; infant formula; human milk; LCSFAs; palmitic acid; myristic acid; stearic acid; fat absorption; Ca absorption; stool consistency

1. Introduction

Breastfeeding is considered the ideal source of nutrition. Consequently, human milk (HM) composition has been used to guide infant formula (IF) design. Despite many improvements in the nutrient composition of IF during the last few decades, there are still important differences in composition as well as in the functional benefits between HM and IF. In particular, there are still differences in fat and calcium (Ca) absorption, as well as in gastrointestinal tolerance, between breast-fed (BF) and formula-fed (FF) infants. FF infants have lower absorption of both fat and Ca than BF infants. Furthermore, BF infants have more frequent and runny or loose soft stools than FF