Interfacial behavior of milk polar lipids and their influence on gastric lipase adsorption: a natural effective delivery system


To cite this version:

Claire Bourlieu, Wafa Mahdoueni, Gilles Paboeuf, Samira de Oliveira, Stephane Pezennec, et al.. Interfacial behavior of milk polar lipids and their influence on gastric lipase adsorption: a natural effective delivery system. 107. AOCS Annual Meeting & Expo, May 2016, Salt Lake City, United States. hal-02743140

HAL Id: hal-02743140
https://hal.inrae.fr/hal-02743140
Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Interfacial behavior of milk polar lipids and their influence on gastric lipase adsorption: a natural effective delivery system

C. Bourlieu¹²⁵*, W. Mahdoueni¹², G. Paboeuf§, S. de Oliveira¹², S. Pezennec¹², J.-F. Cavalier⁴, S. Bouhallab¹², D. Dupont¹², P. Villeneuve², F. Carrière⁴, V. Vié³

¹INRA, UMR 1253 STLO, France, ²Agrocampus Ouest UMR 1253 STLO, France; ³IPR Institute of Physics, Rennes University 1, France, ⁴CNRS, Aix-Marseille Université, UMR 7282 EIPL, France, ⁵CIRAD, UMR IATE, France.

The polar lipids in human milk fat globule membranes condition the accessibility and enzymatic digestibility of milk lipids. Their substitution by bovine polar lipids to produce infant formulas biomimetic of human milk has been suggested. However a comparison of the interfacial behavior of bovine and human polar lipids and of their interaction with the first enzyme involved in fat digestion, gastric lipase, is lacking.

Such comparison is here undertaken using complementary biophysical tools: tensiometry, ellipsometry, Brewster angle and atomic force microscopy, in the presence or in the absence of gastric lipase. Polar lipids extracts were obtained from a pool of human milk (n=5) or bovine butterserum and analyzed using GC and HPLC.

Human milk polar lipids (HMPL) presented a higher compressibility than bovine milk polar lipids (BMPL). Despite the presence of liquid condensed domains in both extracts, their morphological aspect and growth differed in relation with the lipid composition. Lipid phase separation impacted on gastric lipase adsorption in both extracts with an exclusive adsorption onto the liquid expanded phase. Despite differences in their physico-chemical properties, both polar lipid extracts share close interfacial reactivity in gastric conditions. This biophysical characterization will be broadened to other milk polar lipids interesting for human milk substitution.