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What are the mechanisms of gastrointestinal lipases adsorption onto heterogeneous biomimetic vegetal membranes?

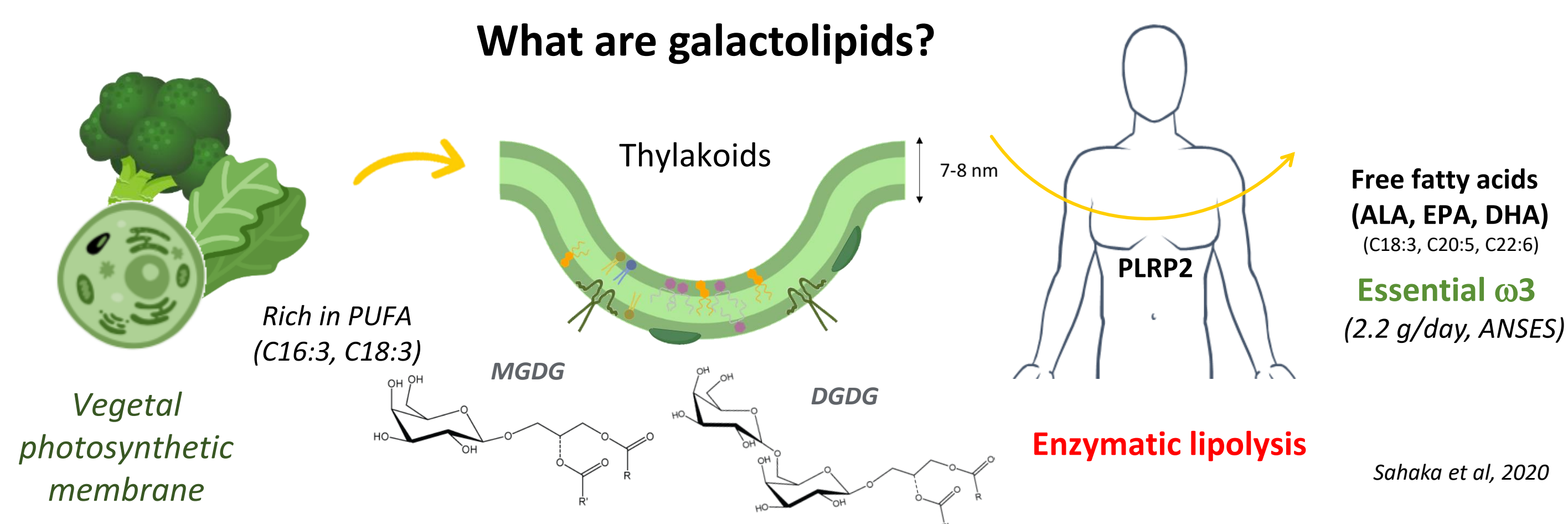
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Objectives: to characterize main digestive lipases adsorption onto heterogeneous biomimetic vegetal membrane of increasing complexity and their lipolytic activities using complementary biophysical tools (tensiometry, ellipsometry, atomic force microscopy) and *in vitro* digestion.

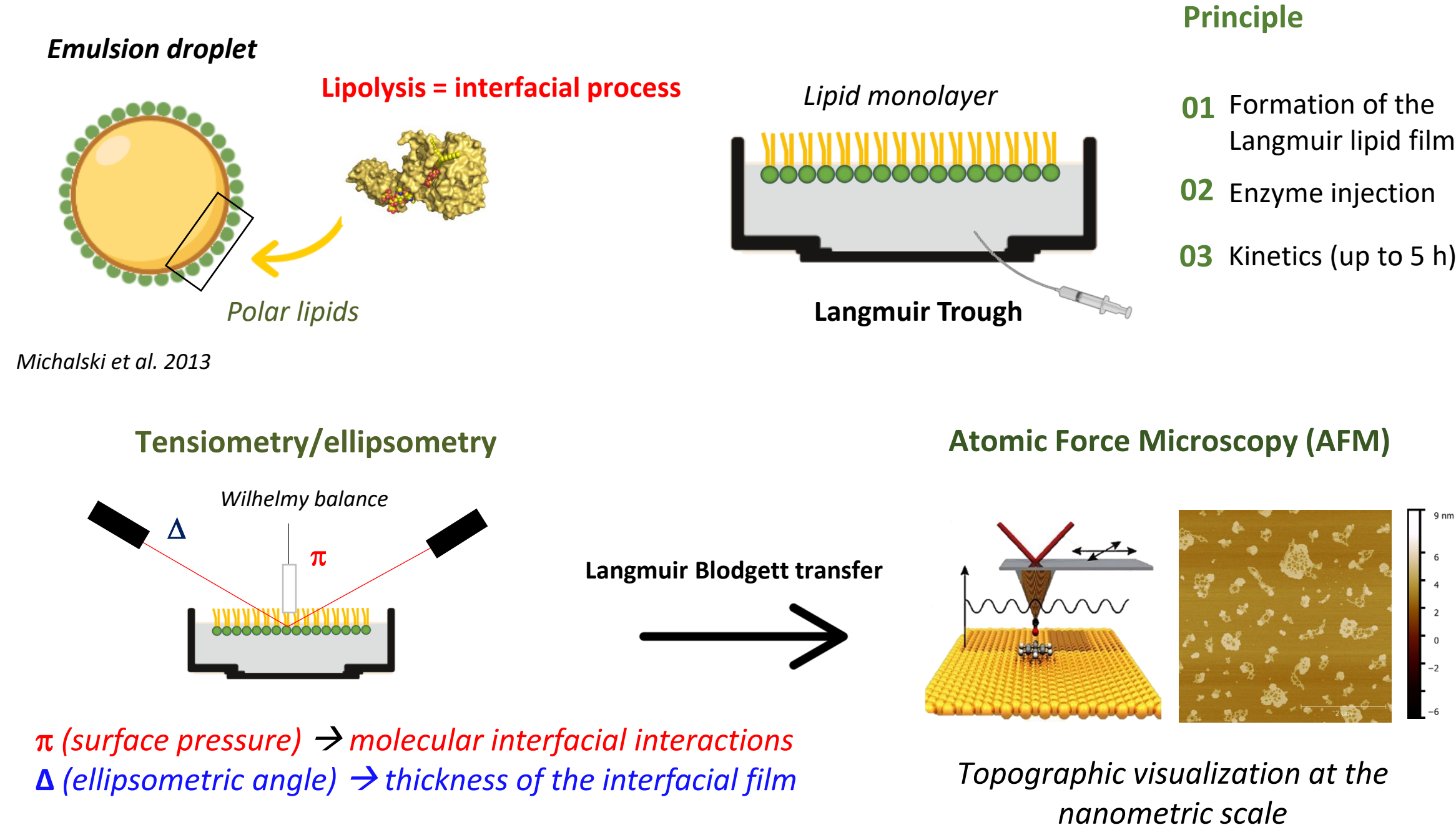
Context

Gastrointestinal lipases are crucial for **lipid hydrolysis** and must get adsorbed onto the substrate **interface** prior lipolysis. Such adsorption has not been deeply investigated on biomimetic vegetal membranes containing **galactolipids** as backbone. We had previously demonstrated on model milk fat membrane that phase **heterogeneity** modulated lipase **adsorption**. We wanted to check whether this behavior was generic and the nature of lipolysis products released from such heterogeneous galactolipid based membranes.

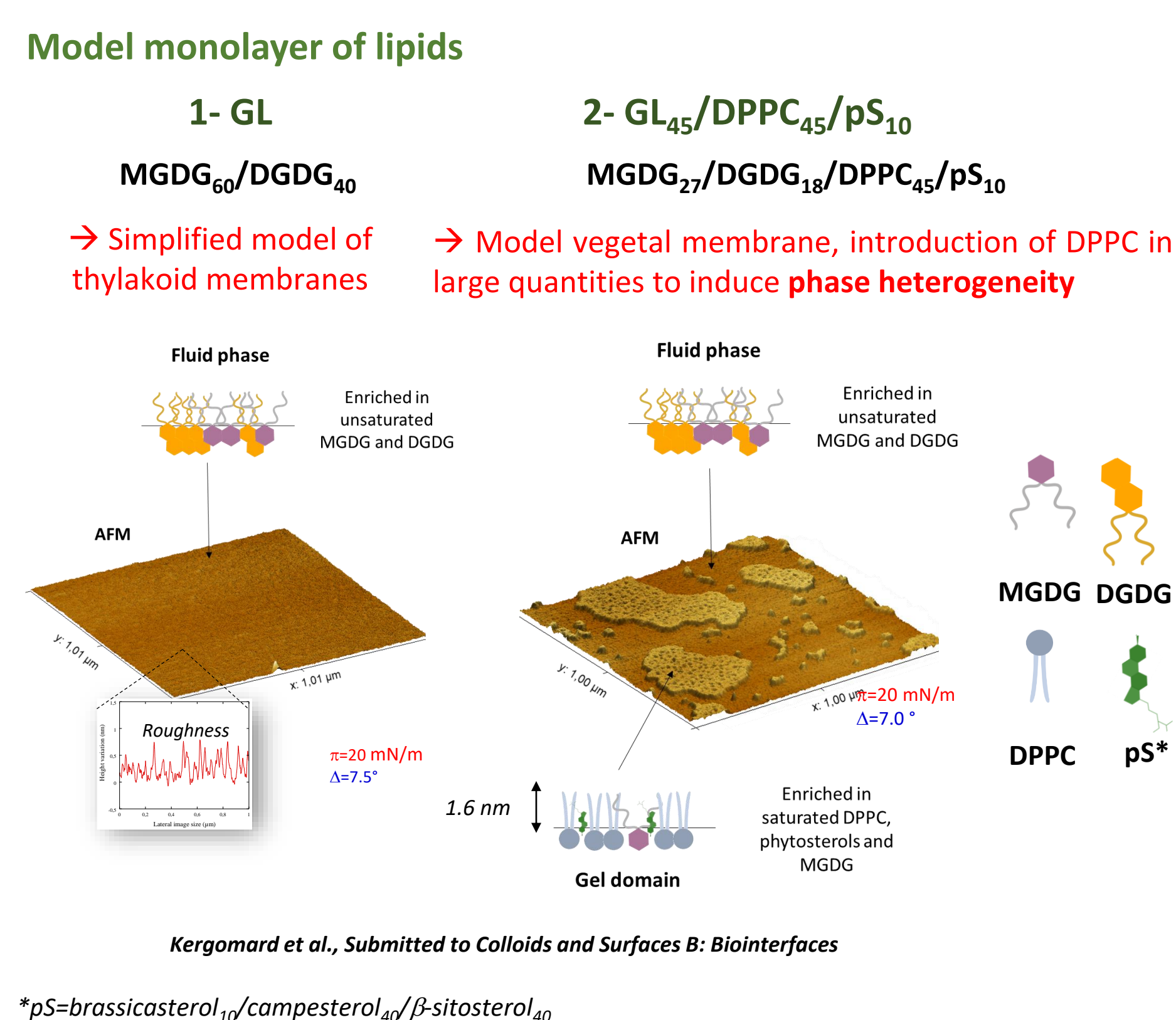


Materials and Methods

How did we proceed?

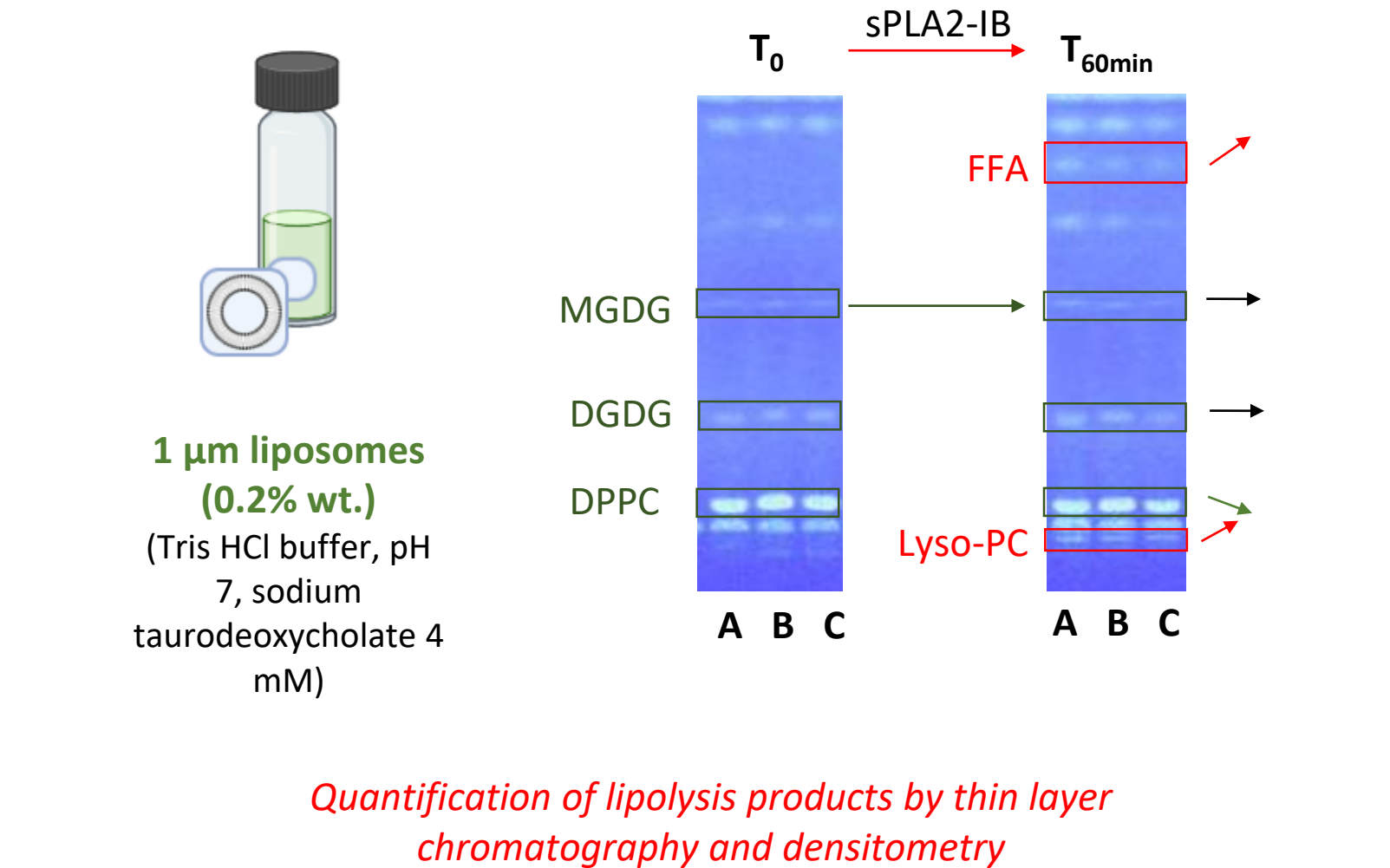


What did we study?



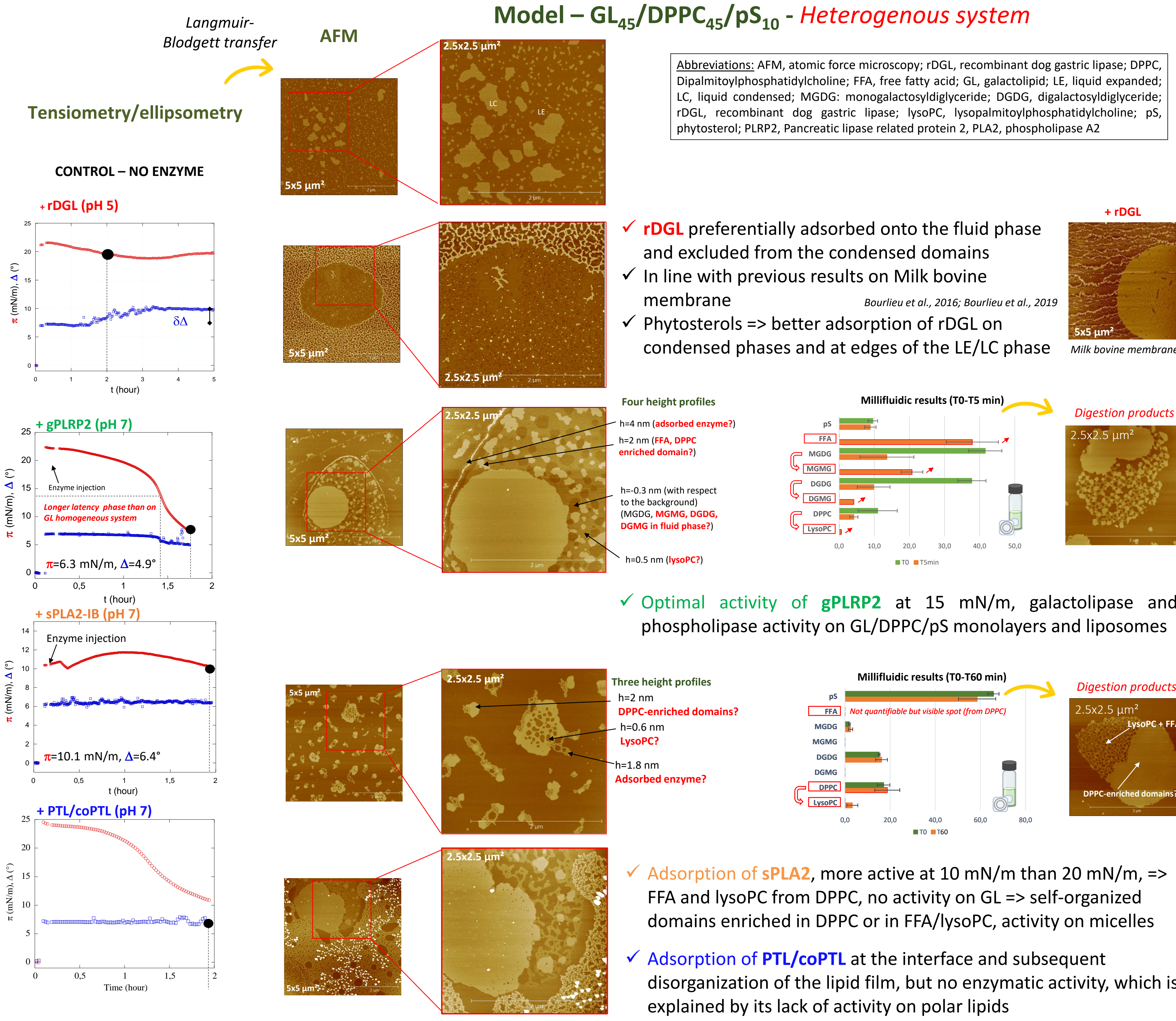
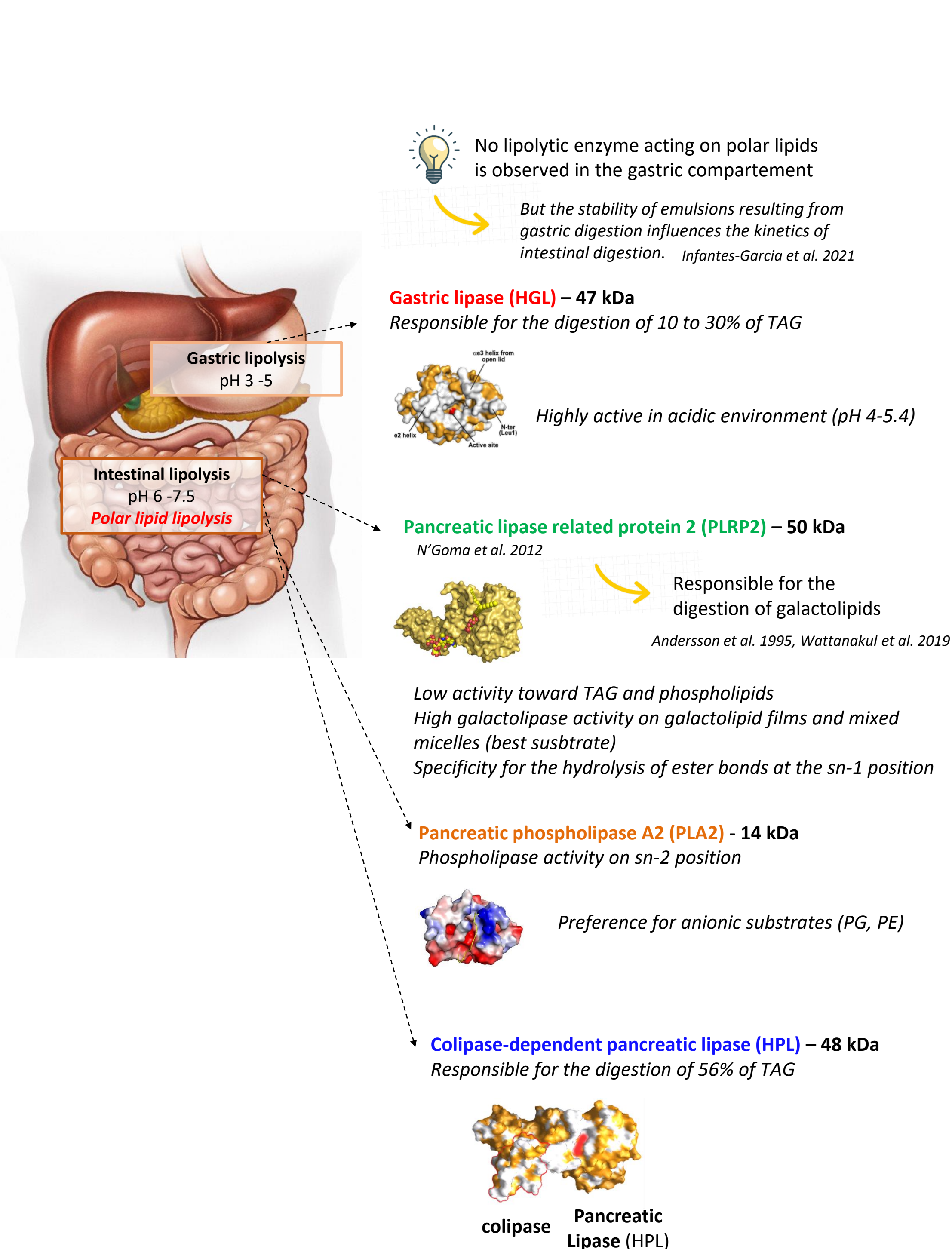
Gastro-intestinal enzymes / microdigestions

- 01 Gastric lipase (DGL) \Rightarrow recombinant Dog gastric lipase – 17 μ g/mL
- 02 Pancreatic lipase protein-related 2 (PLRP2) – 32 μ g/mL
- 03 Pancreatic secreted phospholipase A2 (sPLA2-IB) – 32 μ g/mL
- 04 Pancreatic triacylglycerol lipase and its cofactor (PTL-coPTL) – 250 μ g/mL



Results

Enzymes at work in Humans



Conclusions - A strong surfactant property of GL and its preferential adsorption onto fluid lipid phase and at phase boundary were observed, in line with previous results on milk fat globule membrane. With PLRP2, changes in surface pressure indicated strong galactolipase activity and film reorganization. The injection of sPLA2-IB resulted in DPPC lipolysis only and changed the morphology of condensed domains. PTL/coPTL is adsorbed but has no activity. This study is a step forward to understand the interactions of gastrointestinal lipases with plant lipid membranes, an overlooked aspect of lipid digestion.