



**HAL**  
open science

## **A versatile multi-analytical platform for serum metabolomics and lipidomics profiling**

Anne-Lise Royer, Hector Gallart-Ayala, Jean-Philippe Antignac, Gaud Dervilly, Fabrice Monteau, Bruno Le Bizec

► **To cite this version:**

Anne-Lise Royer, Hector Gallart-Ayala, Jean-Philippe Antignac, Gaud Dervilly, Fabrice Monteau, et al.. A versatile multi-analytical platform for serum metabolomics and lipidomics profiling. Journées scientifiques RFMF 2014, May 2014, Lyon, France. hal-04259409

**HAL Id: hal-04259409**

**<https://hal.science/hal-04259409v1>**

Submitted on 26 Oct 2023

**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.

# A VERSATILE MULTI-ANALYTICAL PLATFORM FOR SERUM METABOLOMICS AND LIPIDOMICS PROFILING

Anne-Lise Royer, Hector Gallart-Ayala, Jean-Philippe Antignac, Gaud Dervilly-Pinel, Fabrice Monteau and Bruno Le Bizec



LABORATOIRE D'ÉTUDE DES RÉSIDUS ET CONTAMINANTS DANS LES ALIMENTS (LABERCA)  
 USC INRA 1329, Oniris, LUNAM Université, BP 50707, 44307 Nantes Cedex 3, France  
 Fax : +33 (0)2 40 68 78 78 - Tél : +33 (0)2 40 68 78 80  
[laberca@oniris-nantes.fr](mailto:laberca@oniris-nantes.fr) - [www.laberca.org](http://www.laberca.org)



RÉSEAU FRANÇAIS DE MÉTABOLOMIQUE ET FLUXOMIQUE



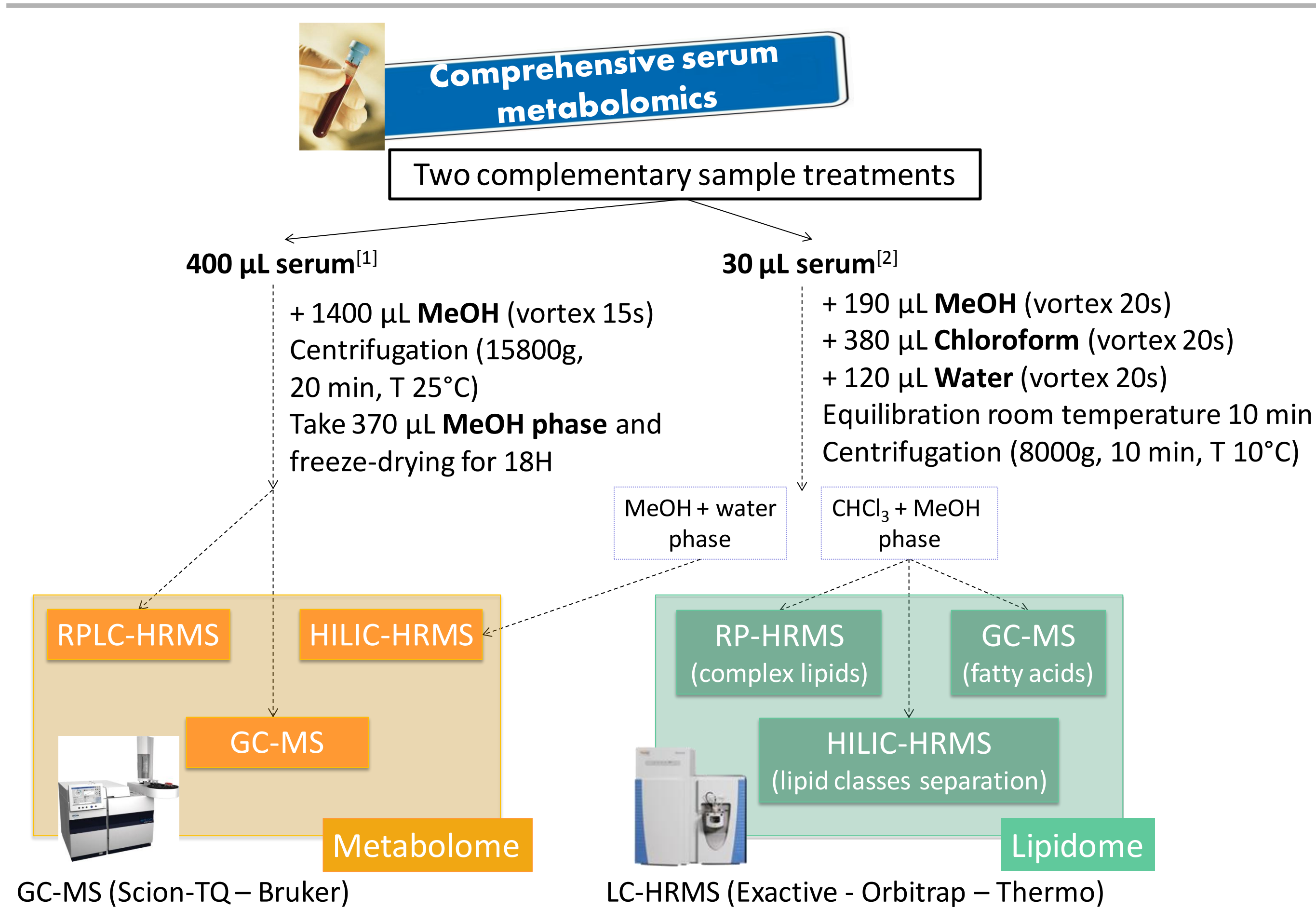
École Nationale Vétérinaire, Agroalimentaire et de l'Alimentation  
 Nantes Atlantique

## Introduction

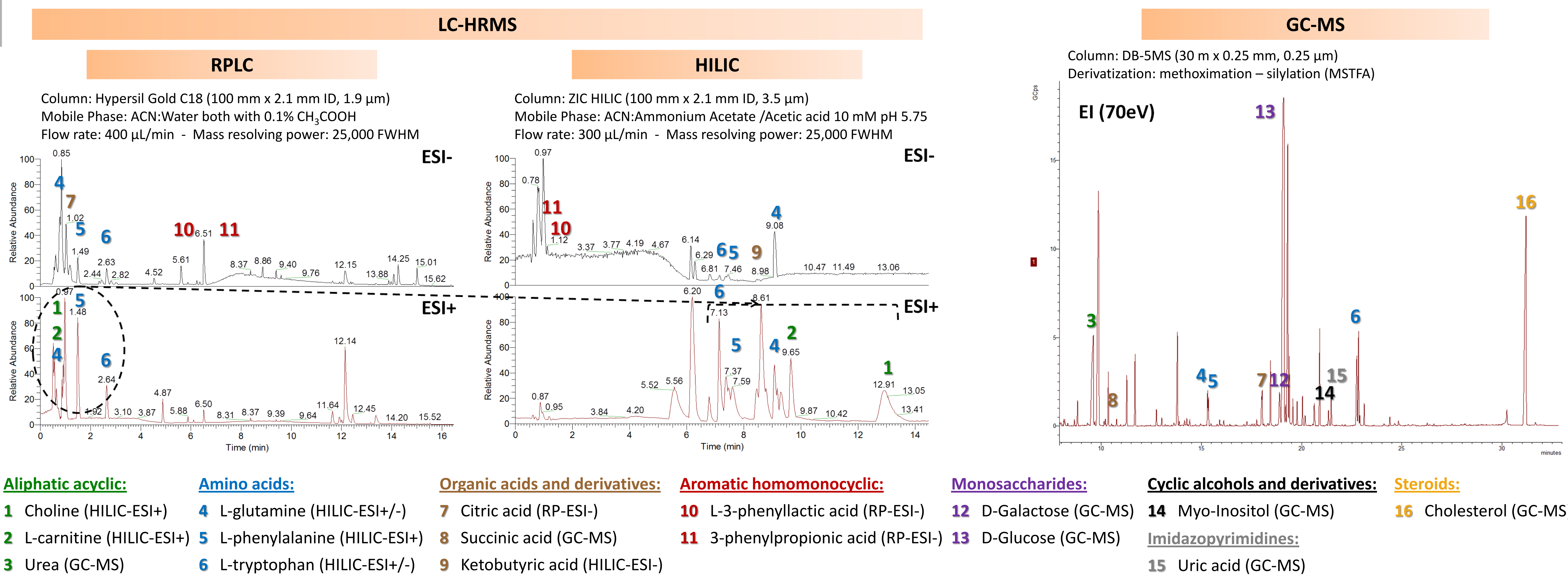
Metabolomic analysis of serum has been successfully applied for the discovery of biomarkers notably in a wide variety of areas such as physiology, toxicology, or nutrition. Serum contains hundreds even thousands of metabolites, thus allowing giving an appropriate overview of the metabolism. Due to these varieties in the metabolome, no single analytical technique can cover the entire metabolites analysis.

In this work, a multi-analytical platform based on LC-HRMS and GC-MS has been developed for a comprehensive characterization of both metabolic and lipidic content of serum samples. The analyses of metabolites with different polarities have been carried out by two complementary LC-HRMS methods (reversed phase and HILIC) and GC-MS. On the other hand, a sensitive and selective GC-MS method has been developed for the analysis of fatty acids, while the analysis of complex lipids such as glycerolipids and glycerophospholipids was performed by LC-HRMS using a reversed phase chromatographic separation for lipid speciation and HILIC for lipid classes separation.

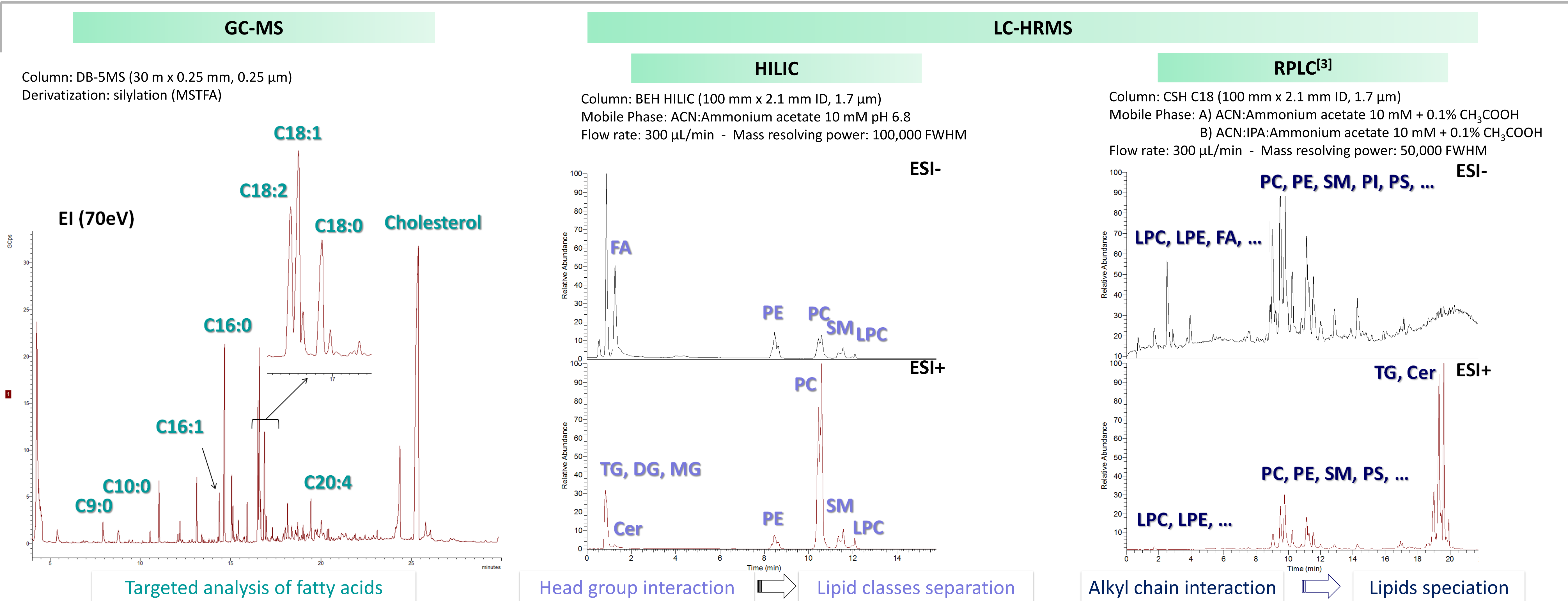
## Workflow



## Metabolome



## Lipidome



## Conclusion

- The use of RP and HILIC chromatography allowed to obtain a complementary chromatographic separations for metabolomics approaches and analysis of complex lipids.
- GC-MS makes enable the detection of specific metabolites generally not detected by LC-MS simultaneously with other polar metabolites. Moreover, good chromatographic resolution and selectivity have been achieved for the analysis of fatty acids.
- This versatile multi-analytical platform can be applied to look for biomarkers of exposure and/or effect related to chemical food safety.

### References:

- [1] Dunn, W.B., et al., Nature Protocols, 2011, 1060-1083.
- [2] Bligh, E.G., and Dyer, W.J., Can. J. Biochem. Physiol., 1959, 37(8):911-7.
- [3] Gallart-Ayala, H., et al, Analytica Chimica Acta, 2013, 75-83.