

## Lipidomics profiling and fingerprinting methodology

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### Organisation

**Name of the organisation** Ghent University (UGent)

#### Department

Faculty of Veterinary Medicine, Department of Veterinary Public Health and Food Safety

**Country** Belgium

**Geographical Area** Flemish Region

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Animal health, Environment, Human health
<b>The Method is situated in</b>	Basic Research, Translational - Applied Research
<b>Type of method</b>	In chemico: Lipidomics

## DESCRIPTION

### Method keywords

metabolomics  
lipidomics  
Lipids  
profiling  
fingerprinting  
feces  
urine  
mass spectrometry  
Liquid chromatography  
cell culture  
colon tissue

### Scientific area keywords

analytical chemistry  
metabolic disorders  
inflammation  
biofluids  
food allergy  
cancer research

## Method description

Our lipidomics profiling and fingerprinting methodology enables the analysis of all lipids within a biological matrix. These lipids can then be compared between an individual or condition with a specific metabolic state and healthy controls to find biomarkers or pathways that can be related to diseases. It applies ultra-high performance liquid chromatography coupled to hybrid quadrupole-Orbitrap high-resolution mass spectrometry. Both the instrumental method, as well as generic extraction protocols for colon tissue, cell cultures, blood, urine and feces have been extensively validated in both a targeted as well as an untargeted fashion. The lipidomics workflow consists of a sample preparation, followed by the UPHLC-HRMS analysis, after which multivariate statistical analysis will be performed to identify potential biomarker candidates or altered pathways, associated with a specific metabolic state.

## Lab equipment

UHPLC ;  
HR-Orbitrap-MS.

## Method status

History of use  
Internally validated  
Published in peer reviewed journal

## PROS, CONS & FUTURE POTENTIAL

### Advantages

Lipids are involved in a plethora of biological processes, including energy homeostasis, immune response, membrane architecture, enzyme activity, inflammation, cellular signaling and transduction of cellular events. Evidently, a dysregulated lipid metabolism has been implicated in a variety of pathological conditions. Therefore, the measurement of this lipidome, which is at the end of the genome-transcriptome-proteome cascade, will provide the most holistic image of the phenotype of a patient. Additionally, it provides both a qualitative as well as a quantitative functional read-out. Therefore, it can be considered the method of choice for hypothesis testing and hypothesis generation.

### Challenges

Multi-step procedure => Long analysis time, extensive sample preparation.  
Big data handling.

### Modifications

The method can be adapted to other matrices or other animal species when necessary.

## REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

### References

Van Meulebroek et al (2017)  
Analytical Chemistry Rombouts et al (2019)  
Analytica Chimica Acta De Spiegeleer et al (2019) submitted

### Associated documents

[Van Meulebroek et al. 2017.pdf](#)  
[Rombouts et al, 2019.pdf](#)

### Links

Van Meulebroek et al, 2017  
Rombouts et al, 2019

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