Polar metabolomics profiling and fingerprinting methodology

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Organisation

Name of the organisation Ghent University (UGent)

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Faculty of Veterinary Medicine, Department of Veterinary Public Health and Food Safety
Country Belgium
Geographical Area Flemish Region

SCOPE OF THE METHOD

The Method relates to	Animal health, Environment, Human health
The Method is situated in	Basic Research, Translational - Applied Research
Type of method	In chemico: Metabolomics

DESCRIPTION

Method keywords

metabolomics
mass spectrometry
Liquid chromatography
metabolic profiling
Metabolism
metabolic fingerprinting
biofluids
urine
feces
saliva
blood
cell culture
colon tissue

Scientific area keywords

analytical chemistry
metabolic disorders
inflammation
biofluids

cancer research
food allergy

Method description

Our polar metabolomics profiling and fingerprinting methodology 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, urine, feces, plasma and saliva have been extensively validated in both a targeted as well as an untargeted fashion. The metabolomics 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

HPLC ;
HR-Orbitrap-MS.

Method status

Internally validated
Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

The metabolome is considered as the endpoint of metabolism and is therefore influenced by amongst others the genes, the diet, the environment and the residing microbiome. As such, the measurement of the metabolome provides 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

Vanden Bussche et al (2015)
Analytical Chemistry, 87, 10927-10934 De Paepe et al (2018)
Analytica Chimica Acta, 1033, 108-118 Rombouts et al (2019)
Analytica Chimica Acta, 1066, 79-92 Wijnant et al (2019) submitted
De Spiegeleer et al (2019) submitted

Associated documents

De Paepe et al, 2018.pdf
Rombouts et al, 2019.pdf
Vandenbussche et al, 2015.pdf

Links

Rombouts et al, 2019
De Paepe et al, 2018
Vanden Bussche et al, 2015

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