The Evaluation of DNA-adduct Formation through DNA-Adductomics

Commonly used acronym: *DNA adductomics*

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Organisation

Name of the organisation Ghent University (UGent)

Department

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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: DNA-Adductomics

DESCRIPTION

Method keywords

DNA damage
DNA adductomics
mass spectrometry
Liquid chromatography
metabolomics

Scientific area keywords

analytical chemistry
cancer research
genotoxicity and carcinogenicity
red meat consumption
food safety
mycotoxins

Method description

It is the goal of the DNA-adductomics to search for DNA-adducts that might be formed during interaction with contaminants. The analysis of DNA adducts is performed using ultra-high performance liquid chromatography coupled to hybrid quadrupole-Orbitrap high

resolution mass spectrometry. Both the instrumental method, as well as generic extraction protocol have been extensively validated and enable both a targeted as well as an untargeted DNA adduct analysis. The metabolomics workflow consists of a sample preparation, followed by the UPHLC-HRMS analysis, after which multivariate statistical analysis will be performed to identify DNA-adducts.

Lab equipment

UHPLC ;
HR-Otrbitrap-MS.

Method status

Internally validated
Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

Investigation of DNA adduct formation can provide valuable information on exposure to both environmental and endogenous chemicals with genotoxic, mutagenic and/or carcinogenic properties on the one hand, and their possible adverse health effects on the other.
DNA adduct analysis can be very useful to investigate the underlying pathways of several non-hereditary cancers, which comprise the vast majority of cancer cases.

Challenges

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

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

References

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Hemeryck et al (2015) Analytica Chimica Acta, 892, 123-131 L.Y.
Hemeryck et al (2016) Analytical Chemistry, 88, 7436-7446 L.Y.
Hemeryck et al (2017) Food Chemistry, 230, 378-387 L.Y.
Hemeryck et al (2018) Food and Chemical Toxicology, 115, 73-87

Associated documents

Vanden Bussche et al, 2012.pdf
Hemeryck et al, 2017.pdf
Hemeryck et al, 2018.pdf
Hemeryck et al, 2015.pdf
Hemercyk et al, 2016.pdf

Links

Vanden Bussche et al, 2012
L.Y. Hemeryck et al, 2015
L.Y. Hemeryck et al, 2016
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