EMN Live Webinars

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'GC×GC-TOFMS in medical volatolomics'

Comprehensive two-dimensional gas chromatography (GC×GC), especially when coupled to fast acquisition time-of-flight mass spectrometry (TOFMS) is undoubtfully a powerful tool for the elucidation of complex mixtures of low molecular weight chemicals. Such (semi)-volatile organic compounds (VOCs) are the ones targeted in volatile metabolomics (Volatolomics). In humans, because endogenous VOCs are an open window on metabolic processes, the chemical profiling of these VOCs has a high potential for the study and diagnosis of diseases. A broad range of body fluids (saliva, blood, urine, feces, breath,...) can be considered in medical volatolomics and are known to be made of hundreds of chemicals, possibly containing specific markers of the health status.

The objective of this presentation is to scroll over a few recent applications of GC×GC-TOFMS in medical volatolomics to illustrate its potential contribution to early minimally invasive diagnostic approaches.

Jean-François (Jef) Focant is Full Professor at the Chemistry Department at ULiege in Belgium. Expert in multidimensional GC coupled to MS, his team develops and validates analytical methods for the measurement of (semi)volatile molecules present in complex biological matrices. Most recent activities are focused on metabolomics (volatilomics, breathomics), especially oriented to biomarker discovery in medical applications. The team also specializes in specific chemometric solutions for feature selections over large data sets from multi-class studies (forensics, petroleomics, ...)

Dr. Pierre-Hugues Stefanuto

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‘Understanding lung inflammation mechanisms using GC×GC-TOFMS’

Chronic respiratory diseases, such as asthma and obstructive disease (COPD), represent a major global health issue. The world health organization estimates that 235 million people suffer from asthma and 3 million people die from COPD every year. These diseases are complicated and not curable. Different inflammation phenotypes exist, and an accurate phenotyping is necessary to establish the proper treatment regime.

Our research is focusing on the development of metabolomics strategies to understand the different inflammation mechanisms taking place in chronic respiratory diseases. A better understanding of the processes taking place at the molecular level would help to develop new treatment routes and monitoring tools. To achieve this goal, we are applying multidimensional chromatography coupled to mass spectrometry for the characterization of various ex vivo lung samples, such as exhaled breath and bronchoalveolar lavages. We are also studying and developing various in vitro models of the diseases.

The objective of this presentation is to share the most recent developments on the metabolic understanding of chronic lung inflammation of the molecular level using a multidimensional and multi-matrix approach.

Pierre-Hugues Stefanuto is lead scientist and lecturer at Liège University in Belgium. His main research interest is the development of analytical solutions based on chromatography and mass spectrometry technology. He has developed a strong expertise in multidimensional methods to increase resolution power. He is interested in the development of statistical models for method optimization and data handling. He is working on the development of multimodal solutions of untargeted screening of small molecules.

Driving Research Goal: Development of multi-omics screening to tackle analytical challenges at the molecular level