

GC×GC-(HR)TOFMS : A KEY PLAYER IN YOUR TOOL BOX FOR MEDICAL APPLICATIONS

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GC×GC-(HR)TOFMS has reached maturity and can now be used to solve routine complex Separation Science issues. This is particularly true for several medical applications that require untargeted screening of biological markers of interest either for population screening or better understanding of specific biological pathways. However, this increase of analytical resolution comes with an increase of system and data complexity. This creates a critical need for adequate method optimization and quality control (QC) protocols to insure the proper use of the analytical instrument, and robust data processing flow for interpretation. In that context, examples of the use of thermal desorption (TD) and solid-phase microextraction (SPME) GC×GC-(HR)TOFMS will be highlighted in the field of respiratory diseases. SPME-GC×GC-HRTOFMS analyses of volatile profiles of bronchoalveolar lavage fluid (BALF) were carried out. Collecting BALF is a widely performed medical procedure that provides important information about immunologic, inflammatory, and infectious processes in the airways. Pooled BALF samples were used to create a QC sample subsequently used for method development and for the implementation of a QC protocol for non-targeted analysis of volatile mixtures in arrays of biological matrices. TD-GC×GC-HRTOFMS Analyses of volatile organic compounds (VOCs) from breath were further successfully carried out as a non-invasive diagnostic approach to differentiate between different inflammatory profiles. The extraction of the volatile profile of exhaled breath of patients following dedicated data (pre-)processing and statistical treatments allowed the discrimination according to their respective phenotypes. These studies aim to provide guidance for the establishment of robust GC×GC-TOFMS strategies for non-targeted analysis in medical applications.