# Characterization of human exhaled breath for non-invasive detection of diseases by GC×GC-TOFMS

**R. Pesesse[1], P.-H. Stefanuto[1], F. Schleich[2], M.-A. Meuwis[3], E. Louis[3], R. Louis[2], J.-F. Focant[1]**

[1]Organic and Biological Analytical Chemistry, CART, Chemistry Department, University of Liège, Belgium

[2]Pneumology and Allergology Unit, University Hospital Center, Liège, Belgium

[3]Gastroenterology, Hepatology and Digestive Oncology Unit, University Hospital Center, Liège, Belgium

GC×GC-TOFMS is an ideal tool to consider the characterization of complex matrices of compounds such as the ones produced in breath analysis [1]. Human exhaled breath several hundreds of volatile organic compounds (VOCs) [2]. These VOC profile can be seen as a fingerprint pattern of human being. By performing breath analysis, it has been reported to be to highlight possible markers of a disease in individuals [3].

In this study, TD-GC×GC-TOFMS is used to analyze breath samples in the hope to isolate some putative biomarkers of high incidence diseases such as lung and colorectal cancers. A collaboration with the university hospital of Liège is established to have access patients and collect samples. For each disease (lung cancer and colorectal cancer), exhaled breath samples collected from patients were compared to other exhaled breath samples collected from healthy patients. As air is continuously inhaleted from patients, various levels of environmental VOCs are present and breath VOC profile depends directly on the surrounding environment at the time of sampling. Therefore, daily variations in VOC patterns from environment induce non-reliable results. Several statistical tools and processes (Fisher ratio and PCA) are needed to digest the large amount of data generated by the two-dimensional chromatograms of large number of different samples, and to minimize the impact of VOC contaminants issued from the environment and personal behaviors.

We produced preliminary data that demonstrated the possibility to establish the basis of a non-invasive diagnostic for these diseases by means of breath analysis. A short list of potential biomarkers is characterized among the large number of peaks detected initially. Strategies of samples screening approaches are also discussed.

1. Phillips M, Cataneo M, *et al*. (2013) Plos one 8(9): e75274

2.Horvath I (2009) Eur Respir J **34**(1): 261-275.

3. Das M, Biswal C, *et al*. (2013) Anal Chem **86**(2): 1229-1237.