EXHALED AIR ANALYSIS FOR EARLY DETECTION OF LUNG CANCER

Pesesse Romain[1], Pierre-Hugues Stefanuto[1], Florence schleich[2], Renaud Louis[2], Jean-François Focant[1]

[1] Organic and Biological Analytical Chemistry Group, CART - University of Liège, Allée du six août B6c, B-4000 Liège, Belgium

[2] Pneumology and Allergology - University Hospital of Liège, avenue de l'Hôpital 13, 4000 Liège, Belgium

The curability of lung cancer is highly dependent of the early diagnostic [1]. However, lung cancer is typically silent early in its course. Thus, the majority of patients are diagnosed at an advanced stage, resulting in poor prognosis [2]. There is, therefore, an urgent need to develop earlier diagnostic screening tests allowing detection of lung cancer at a more curable stage.
Since Pauling's early chromatographic separation on breath specimen, many studies have focused on lung cancer exhaled biomarkers identification. The volatile organic compounds (VOC) content of the gaseous phase was typically analyzed using GC-MS. A limited number (15 to 30) of VOCs (mainly alkane and benzene derivatives) has been identified by this method as part of a lung cancer VOC profile [3]. However, the complexity of exhaled breath VOC profile requires the use of comprehensive two dimensional gas chromatography coupled to time of flight mass spectrometry (GC×GC-TOFMS) to go deeper in analyte separation and identification. In this work, we used TD-GC×GC-TOFMS to compare breath VOC profiles between patients diagnosed with lung cancer and healthy controls. The separation was followed by a non-targeted approach for data processing. Supervised multivariate and univariate statistical approaches were used to identify potential biomarkers. These candidates were, then, compared to the ones previously reported in the literature using a classical GC approach.

[1] Henschke C, Yankelevitz D, Libby D, et al., New Engl J Med (2006)
[2] Mazzone P J, Breath Res (2008)
[3] Chan H, Lewis C, Thomas P, Lung Cancer (2009)