

In vitro and in vivo volatile fingerprinting of lung cancer

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Abstract

As reported by the American Cancer Society, lung and bronchus cancers have the highest death rate by far, compared to other types of cancer. The main reason is the lack of early stage non-invasive screening methods. Indeed, the death rate of the other most abundant cancers, i.e. colorectum, prostate, and breast, is decreasing due to the implementation of large scale population screening techniques. It is believed that the death rate of lung cancer could be lowered by developing and implementing more efficient diagnostic methods ¹.

During the last couple of decades, a growing number of lung inspection procedures were developed based on breath analysis. These techniques are targeting the signature of the disease inside the volatile organic compounds (VOC) mixture exhaled by the patient ². In the hope of developing a similar technology for cancer diagnostic, we used comprehensive two-dimensional gas chromatography coupled to high-resolution spectrometry (GC×GC-HRMS) to investigate the volatile profile of in vitro and in vivo samples.

A procedure combining headspace sampling and GC×GC-HRMS was applied to cancer cell cultures and exhaled air samples from patients. The two screenings were conducted in parallel in order to obtain independent sources of information. Both studies involved deep data processing techniques combining chromatogram alignment and robust statistics. A statistical separation was obtained between the control and the patient groups. Compounds responsible for this separation were further compared to the in vitro results.

References

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2. Di Francesco F, Fuoco R, Trivella MG, Ceccarini A. Breath analysis: trends in techniques and clinical applications. *Microchemical Journal* 2005; 79; 405-410.