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GC-MS based metabolomics used for the identification of cancer volatile organic compounds biomarkers

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Highlights

- Gas Chromatography coupled to Mass spectrometry and chemometrics for the discovery of cancer biomarkers.
- Analysis of volatiles as a non invasive and promising tool in cancer disease diagnosis and prognosis.
- All major types of cancers and their emitted volatiles have been discussed.
- Recents targeted/untargeted approaches used for the discovery of cancer biomarkers.

Abstract

A biomarker can be a metabolite, coming from a metabolic pathway or cell process, which might be employed in the diagnostic of diseases, predict patient response towards chemical therapies and/or monitor disease recurrences. Biomarkers, e.g. aldehydes or hydrocarbons, are often identified from different body fluids such as blood, urine, serum, saliva or from various tissues samples, and their concentration can vary from one sample to the other. However, the detection and the action of these biomarkers for diseases is a complicated process. Cancer is one of the main cause of death worldwide. The main characteristic of cancerous tumor is the uncontrolled growing of cells inside the organism. Likely, these uncontrolled growths are as consequence changes in the metabolism that could be analytically monitored. Depending on where the cancer cells are located, they provide different characteristics profiles. These profiles as fingerprints are used for differentiation in a comparison to normal cells. This critical study aimed at highlighting the latest progress in this area, especially in the employment of gas chromatography for the monitoring of volatile organic compounds (VOCs) and the identification of possible molecules used as biomarkers for cancer therapy.

Keywords: cancer, metabolomics, GC-MS, metabolites, VOCs