

Abstract

Unveiling the Smell of Health: E-Nose-Based Volatile Organic Compound Analysis of Exhaled Breath in Early Lung Cancer Detection [†]

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Abstract: Lung cancer remains a formidable global health challenge, necessitating the exploration of innovative diagnostic approaches for early detection. This review paper delves into the burgeoning field of exhaled breath analysis using electronic nose (e-nose) technology for the identification of volatile organic compounds (VOCs) as potential biomarkers for lung cancer diagnosis. An electronic nose inspired by the human olfactory system comprises an array of sensors that can detect and differentiate complex odor profiles. This paper elucidates the principles behind e-nose technology and its application in capturing the unique VOC signatures present in exhaled breath, which serve as indicators of underlying physiological conditions. A significant portion of this review is dedicated to elucidating the methodology and advancements in e-nose-based VOC analysis, providing insights into the potential of this non-invasive approach for disease diagnosis. The exploration extends beyond general applications to specifically spotlight the utilization of e-nose technology in the realm of early lung cancer detection. E-nose-based disease diagnosis, and more specifically, lung cancer detection, is discussed in detail, with an emphasis on the recent studies and advancements. The potential of VOC profiling as a reliable and early diagnostic tool for lung cancer is explored, addressing both the promises and challenges associated with this cutting-edge approach. This comprehensive review amalgamates the current state of knowledge in the field, offering a roadmap for future research opportunities and the realization of e-nose technology's promise in revolutionizing lung cancer diagnosis.

Keywords: lung cancer; volatile organic compounds; electronic nose; breath analysis; biomarkers



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