

What does your breath say about you?

The interest in Volatile Organic Compounds (VOCs) from exhaled breath began in ancient Greece where early physicians used the smell of a patient's breath as part of their diagnosis of a disease. The use of breath biomarkers became more commonly known with the introduction of portable breath alcohol tests (e.g., Breathalyzers®) in the 1950s. In 1971, the first scientific study of the use of breath as a potential means of disease diagnosis was published.¹ Since then, there have been numerous studies about the use of exhaled breath VOCs as biomarkers of illnesses, cancers (especially lung cancer), heart disease, environmental toxin exposure, schizophrenia, malnutrition, rheumatoid arthritis, pneumonia, inflammatory bowel disease, liver cirrhosis, etc.^{2,3}

There are several challenges to using exhaled, or alveolar, breath for medical diagnostics. The first is collection of a representative sample. Breath is warm and saturated with water and most analytical techniques require dry or minimal amounts of water for accurate determination of chemical compounds. Also, the volume of air in each breath is different for each individual, and there are differences in the chemical composition of breath depending on the activities of the subject individuals and the environment. The second challenge involves the complexity of the collected sample. Several studies have shown that while there are approximately 200 VOCs in individual exhaled breaths^{1,4,5}, many of those VOCs are different so the number of potential VOCs is over 1,000.³ The wide range of potential VOC types and sizes, as well as low concentrations, requires selective and sensitive instrumentation.

Finally, the interpretation of this complex sample can be difficult because of the many variables of the source (i.e., the body the breath came from). Since the VOCs exhaled from the body are a combination of the products of multiple metabolic processes as well as external sources from the inhaled breath that is passed into and then out of the lungs, determining specific chemical markers of specific metabolic processes can be complicated. Also, the 'normal' concentrations must be known to determine if an individual is outside that range. Despite these challenges, analysis of exhaled breath VOCs as a means of diagnosis remains promising since it also provides a relatively easy, painless, and inexpensive method for testing.

References

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About Prism Analytical Technologies, Inc.

Prism Analytical Technologies, Inc. is a leading consultative air testing laboratory in the United States that is devoted to the chemical identification and analysis of contaminants in the air. We are a recognized leader in the development and deployment of ambient air testing methodologies for Fortune 100 and 500 companies, industrial hygienists, and environmental consultants. Prism's science-based technologies and wide range of air testing support help clients solve indoor air quality, process control, industrial, and environmental challenges.

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