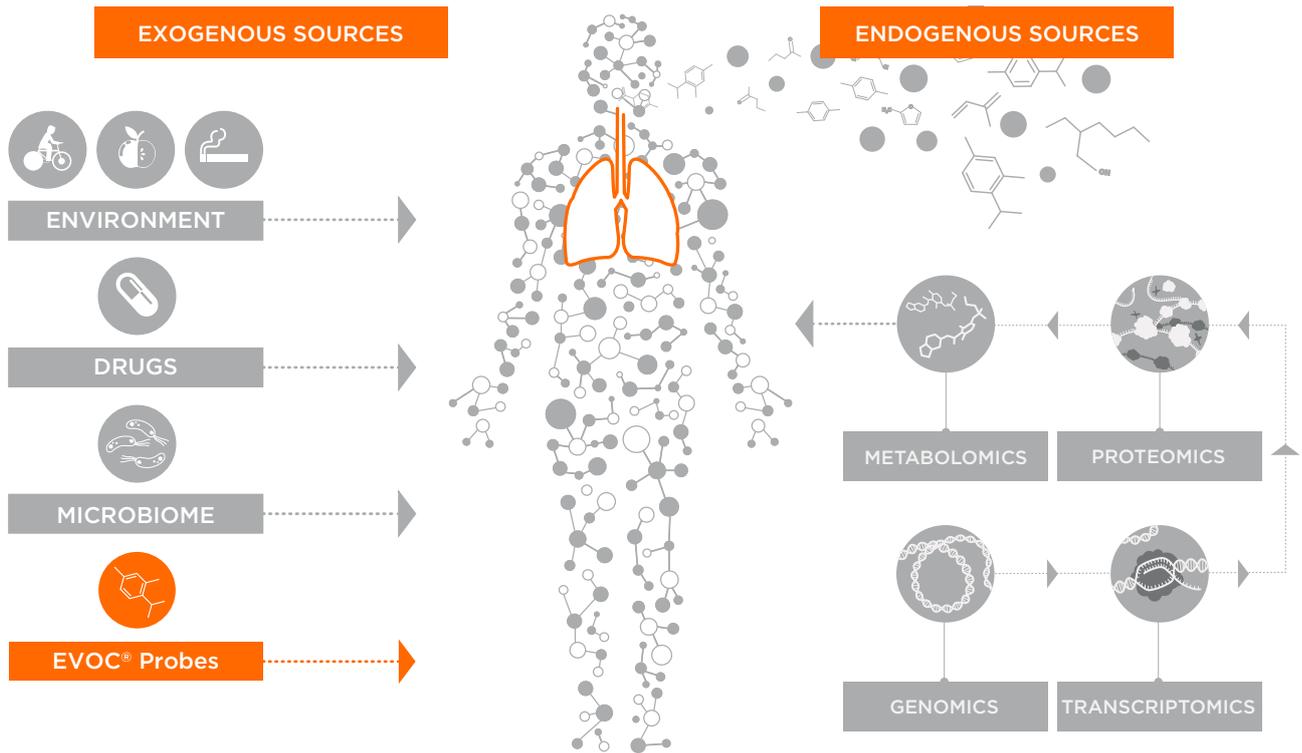


# Non-Invasive Biomarkers on Breath

BREATH<sup>®</sup>  
BIOPSY

A powerful approach for health monitoring, precision medicine and disease detection

Exhaled breath contains both volatile organic compounds (VOCs) and microscopic droplets known as breath aerosol. Both VOCs and breath aerosol can originate within the body and represent rich sources of biological information - which can be collected and analyzed (scan the code to find out more).

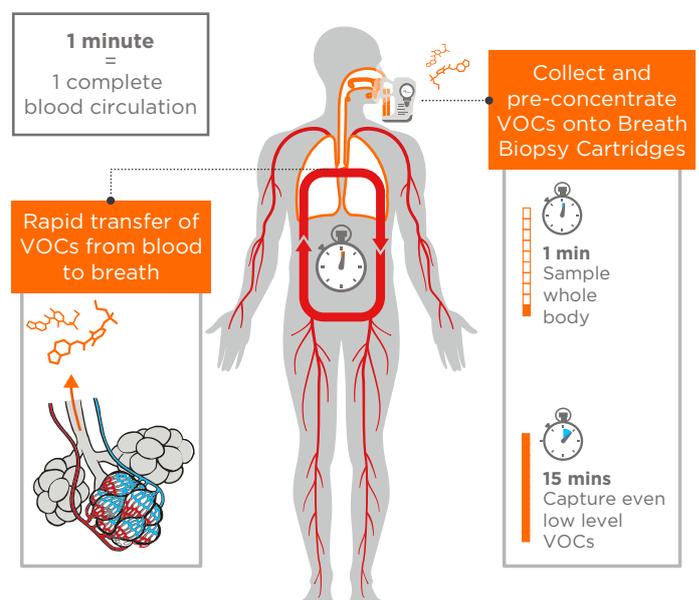


## Origins of VOCs

Studies have identified over 1,000 VOCs that can be found on breath which can originate either from within the body (endogenous VOCs) or from external sources such as diet, prescription drugs and environmental exposure (exogenous VOCs).

Endogenous VOCs are products of metabolic activity throughout the body, picked up in the bloodstream and exchanged into air in the lungs. They can be characteristic of specific disease processes and can be used to sensitively detect even subtle changes during the very early stages of disease.

Previously, exogenous VOCs were often overlooked as environmental contaminants. However, many of them are processed within the body by core metabolic pathways and can provide additional valuable insights into health and disease. Using exogenous VOCs we can assess pathways relevant in drug monitoring, treatment selection and precision medicine. We're harnessing this potential through our **EVOC Probes** ([owlstonemedical.com/evoc](http://owlstonemedical.com/evoc)) method.



# Benefits of Breath Biomarkers

Breath biomarkers could reveal the current state of metabolic and disease processes, with potential applications in early detection, screening, diagnosis, prognosis and precision medicine.

Significant interrelated benefits are unlocked when you opt to collect breath in contrast to other well-established biomarker sampling techniques, such as liquid and tissue biopsies:

## Collection is Non-invasive

Compared to other sampling methods, Breath Biopsy® is both pain- and risk-free. Administering breath collection requires no special facilities or training and can be used with high-risk groups – even for ongoing monitoring.

## Breath is Inexhaustible

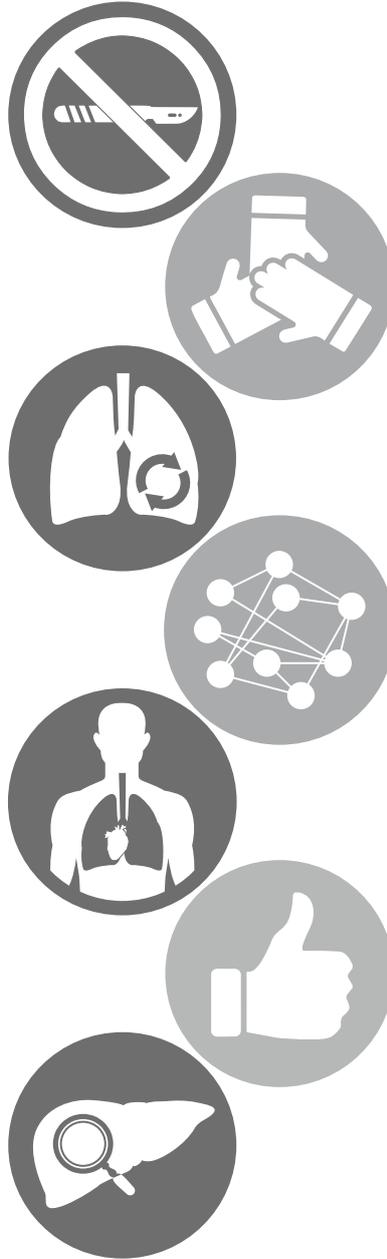
Conventional biopsy techniques have relied upon harvesting finite resources, but exhaled breath is a waste product that the human body produces in large quantities constantly. Unlike tissue and blood, and even waste products such as urine, sweat or feces, with breath collection there are no limits to sample size or frequency.

## Whole Body Monitoring

Every minute a typical person's total blood volume circulates through their lungs, carrying with it VOCs from throughout the body. This connection could potentially allow breath sampling to detect illnesses without prior knowledge of what diseases are present, or where they are in the body.

## Representative Samples

Removing tissue for biopsy is invasive and can have consequences for organ function, patient health and recovery time. Studies in numerous disease areas have suggested breath offers the potential to avoid these additional risks by instead using relevant breath biomarkers to detect illness.



## Sampling is Accessible

Breath sampling is uniquely appropriate for applications outside of normal medical contexts. Providing a breath sample is an entirely non-medical process, compatible with home use in a way tissue and liquid biopsies never could be.

## Samples Reflect Metabolism

Liquid biopsies have been celebrated as a less invasive solution to detect cancer by detecting circulating tumor DNA (ctDNA) from dying cancer cells but they can't usually produce accurate results until large numbers of cells start dying. Breath biomarkers based in metabolism could offer potential opportunities to diagnose diseases earlier, unlocking cheaper treatment pathways and better long-term prognosis.

## Breath Testing is Acceptable to Patients

No matter how accurate a diagnostic test is, if patients consider it to be unpleasant, compliance is reduced and screening becomes less successful. In the future using breath collection, instead of a more invasive option, could boost compliance. This could save lives and spending, as earlier diagnoses can lead to cheaper and more effective treatment pathways.

Visit [owlstonemedical.com](http://owlstonemedical.com) to find out more about Breath Biopsy, or contact our team to discuss identifying and validating breath biomarkers in your research.

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For a closer look at the science of breath biomarkers, you can scan the code to download Breath Biopsy®: The Complete Guide for free.



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