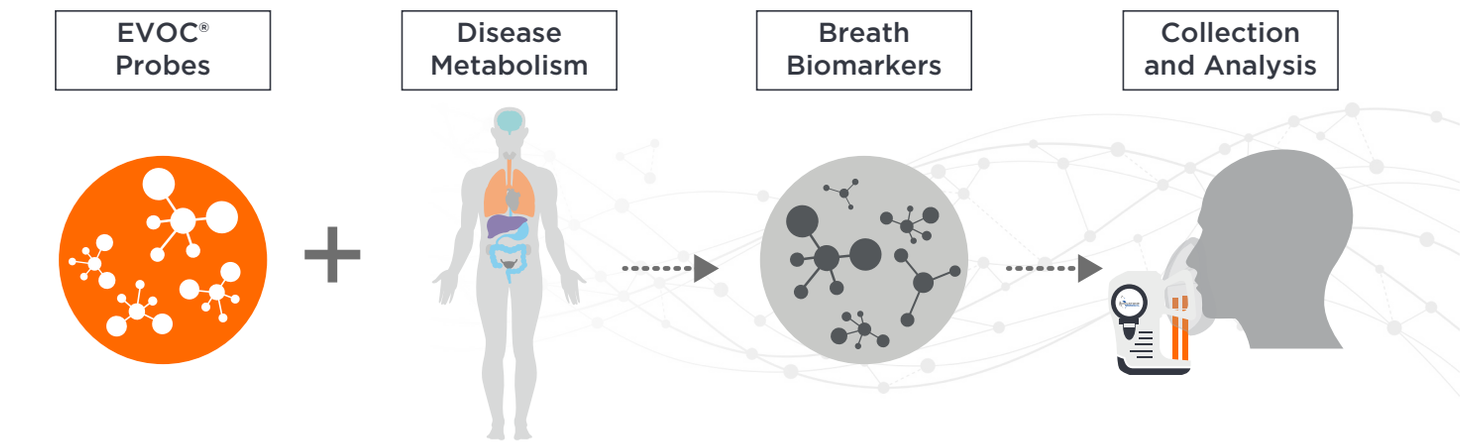
EVOC® Probes

Targeted metabolic probes for non-invasive disease detection

BREATH® BIOPSY

Exogenous volatile organic compound probes (EVOC® Probes) provide a focused alternative to breath biomarker discovery. Probes are developed to target specific disease-relevant metabolic pathways that can be monitored non-invasively using Breath Biopsy®



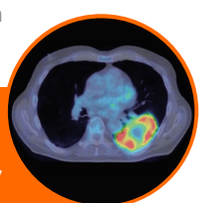
One or more administered EVOC Probes designed to produce distinctive metabolic products

Metabolic processes characteristic of a disease or phenotype

Distinctive metabolic products present on breath support high signal-to-noise detection

Robust, quantifiable, disease-relevant data and interpretation

- Designed based on established links between VOCs and disease pathology
- Enable smaller, more focused trials that can be concluded faster
- Supported by Breath Biopsy for robust, reliable EVOC Probe detection
- Administer several Probes together to monitor multiple metabolic processes



Inspired by Existing Clinical Tests

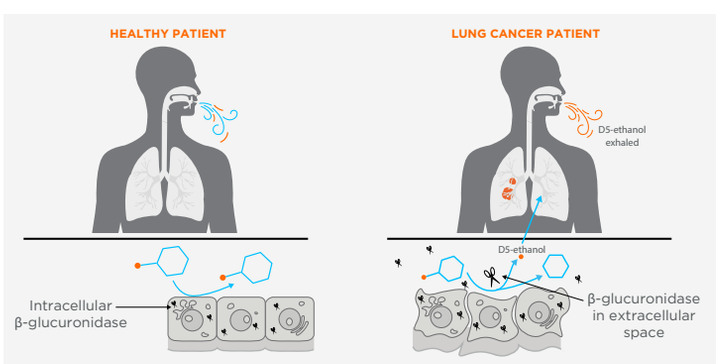
EVOC Probes draw inspiration from widely used clinical methods. Probes such as fluorodeoxyglucose (FDG) detect metabolic changes linked to cancer by using PET scanning.

Similarly, substrates such as fructose, lactose and glucose can be ingested to probe the gut microbiome and detect illnesses such as carbohydrate intolerances and small intestinal bacterial overgrowth.

Proof of Concept: Evolution

Evolution is an ongoing clinical study in which we are evaluating the viability of D5-ethyl-β D-glucuronide as an exogenous volatile organic compound (EVOC) probe for human lung cancers.

D5-ethyl-βD-glucuronide is a substrate for β-glucuronidase, a hydrolyzed enzyme that resides in the lysosome of cells within healthy tissue. D5-ethyl-βD-glucuronide is a hydrophilic compound with low cellular permeability and therefore cannot reach the β-glucuronidase in healthy tissue. In solid tumors however, β-glucuronidase is expressed in the extracellular space and is therefore accessible to the probe. This results in the release of D5-ethanol, a VOC detectable on breath, that is not a product of normal metabolic processes in healthy individuals.



Find out more about our Evolution study:

owlstonemedical.com/evoc

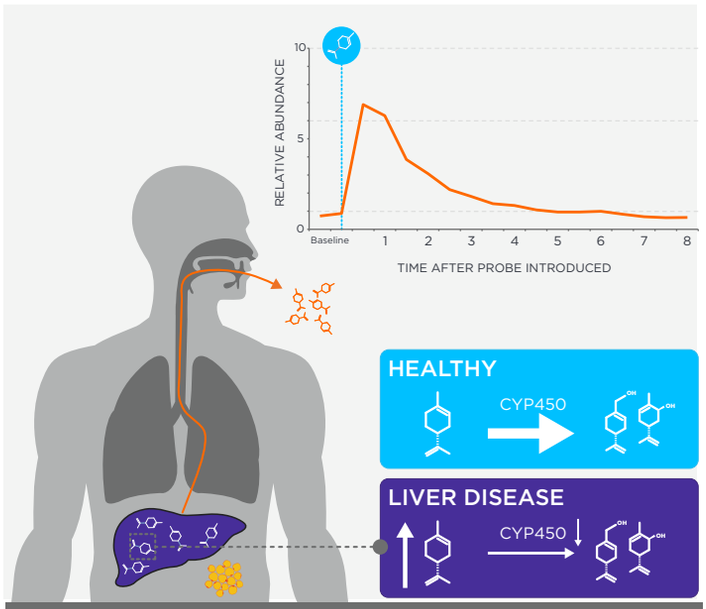
Proof of Concept: Ferrandino et al. (2023)

In a previous study (Ferrandino et al. 2020), the exogenous compound limonene was found to be elevated in the breath of patients with cirrhosis and showed diagnostic potential as an EVOC probe. This compound is metabolized in the liver, and in cirrhotic patients reduced activity of these enzymes impairs hepatic clearance. This results in an extended half-life of limonene in the bloodstream, which raises its abundance in the breath.

The complexity of hepatic metabolic pathways does not allow a comprehensive evaluation of liver function from a single biomarker. Therefore, a combination of multiple VOCs generated by alterations of different metabolic pathways is needed to provide a more exhaustive picture of the liver's condition.

In this study Breath Biopsy OMNI® was used to discover differentially abundant VOCs in patients with cirrhosis in order to identify potential disease-related biomarkers that could be used to diagnose patients with progressive liver disease.

A set of exhaled VOCs with alterations that seem to be driven primarily by functional impairment of the liver were identified. The results underpin earlier observations that downregulation of different hepatic metabolic pathways occurring in cirrhosis, and early stages of liver disease, may be the underlying mechanism. Most of these VOCs were of exogenous origin making them ideal candidates for potential EVOC probes.



Read the full paper now:

Ferrandino et al. (2023)
Journal of Clinical and Translational Hepatology
DOI: 10.14218/JCTH.2022.00309

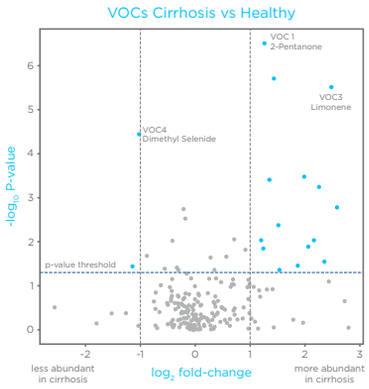


Figure 1: Volcano plot of exhaled VOCs. Limonene and 2-pentanone were elevated in the breath of patients with cirrhosis, while dimethyl selenide was reduced.

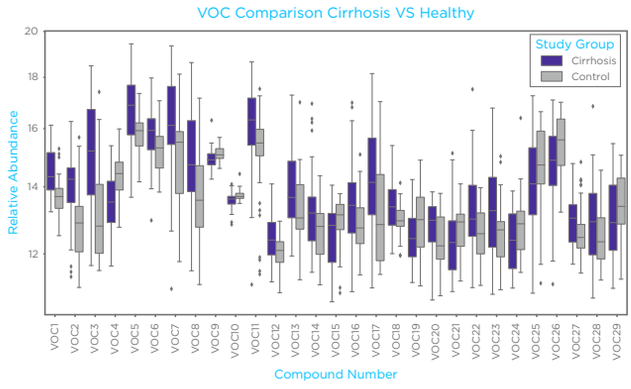


Figure 2: Box plots of discriminatory VOCs between cirrhosis and controls. A total of 29 on-breath VOCs were found significantly different between control and cirrhosis groups.

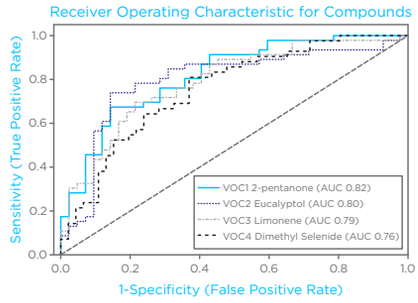


Figure 3: Receiver operating characteristic plots of the four top single VOCs comparing cirrhosis vs controls. The top 4 ROC plots for on-breath VOCs were calculated to explore their discriminatory performance. 2-pentanone, limonene, and dimethyl selenide were found among them.

Contact us to find out more about collaborating with Owlstone Medical and to discuss incorporating Breath Biopsy in your research.

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