

# Breath Biopsy® Applications in NASH

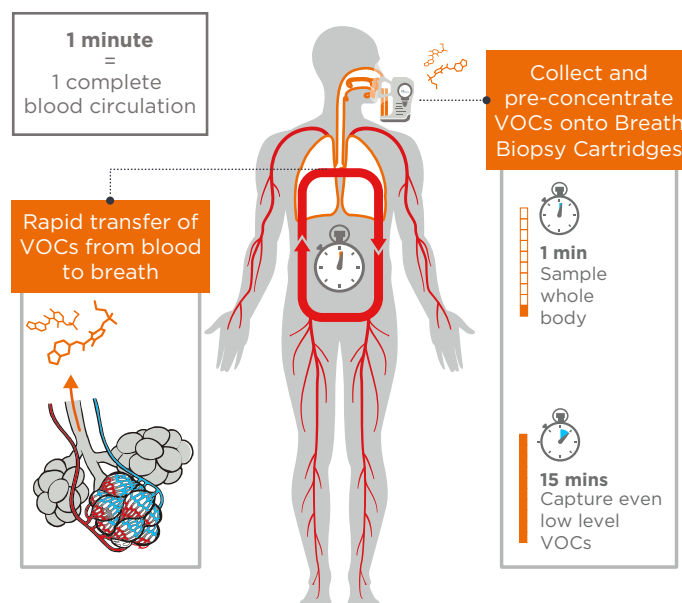
BREATH  
BIOPSY

Breath Biopsy® provides a robust collection system for research into EVOC Probes® for NASH diagnosis.

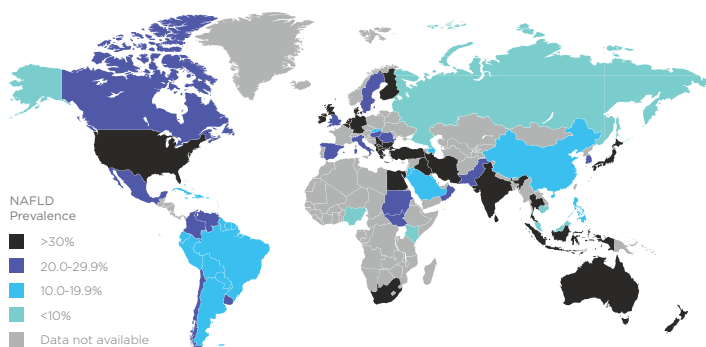
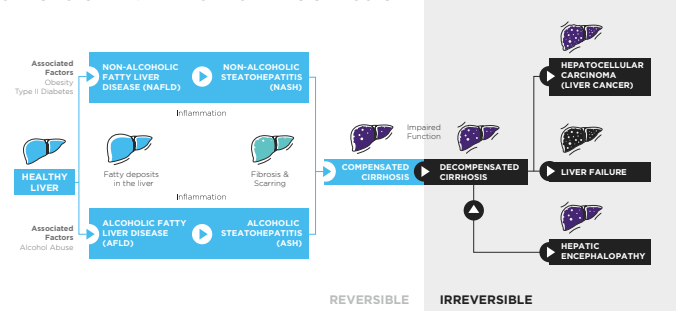
Breath Biopsy represents a new way to interrogate the chemical makeup of breath. Breath biomarkers arise either as volatile organic compounds (VOCs) captured from the air or as larger particles found within exhaled breath aerosols (EBA). Our exogenous volatile organic compound probe (EVOC Probe) work has shown that the VOC limonene is generally present at higher levels in breath samples from people with liver cirrhosis.

## Why Breath Biopsy?

- VOCs perfuse via the blood into the airways from all tissues in the body, meaning Breath Biopsy provides various insights on a wide range of disease areas including, hepatology.
- Breath biomarkers have wide-ranging clinical applications relevant to NASH, such as early detection, disease monitoring and treatment response.
- Uniquely, breath samples can be pre-enriched by taking a longer sample, making it particularly well suited for early detection, allowing for earlier intervention and reducing the number of people progressing to later stages of NASH.
- Breath sampling is non-invasive and pain-free, with no side effects or complications and potential for at-home sampling, unlike expensive tissue biopsies.



## STAGES OF LIVER DISEASE PROGRESSION



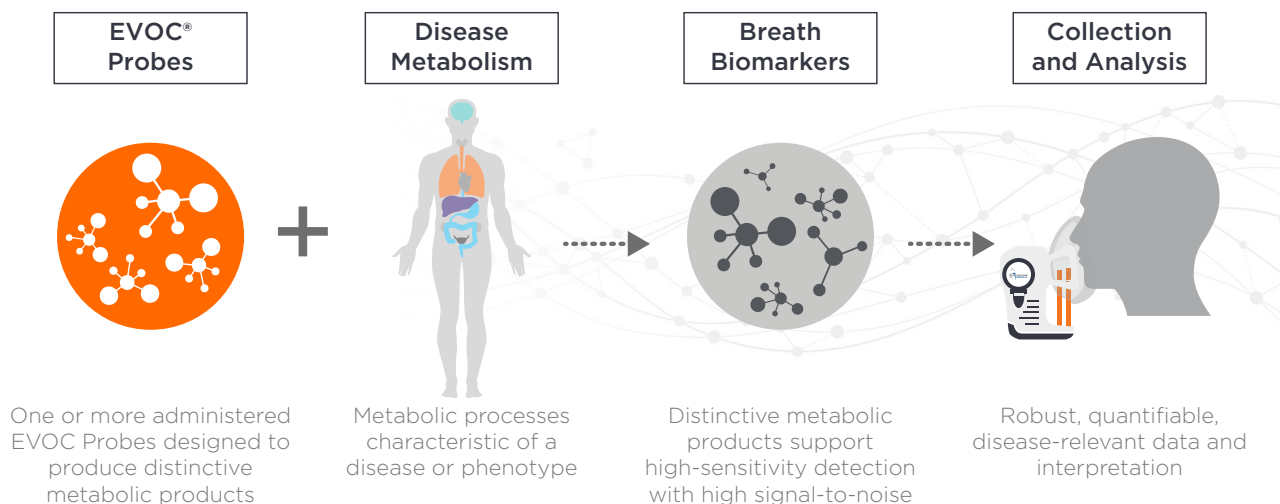
NASH with fibrosis is considered the strongest predictor of adverse clinical outcomes and the FDA encourages drug developers to focus on this area of greatest need. Therefore, therapeutic options for NASH are a critical priority for clinicians, pharmaceutical companies, and regulatory authorities. The epidemic proportions have led to a surge in the development of drugs aimed at reversing or halting the progression of NASH. As such, the FDA are encouraging non-invasive testing for NASH with a particular interest in stopping or reversing progression.

Liver biopsy has long been the gold standard to grade fibrosis in the liver and the only endpoint currently accepted by the FDA. Other non-invasive and simple blood tests and imaging technologies exist to diagnose NASH but are less effective at identifying the stage of NASH. The majority of ongoing therapeutic clinical trials are aimed at F2/F3 NASH and clinical adoption will be affected by the lack of non-invasive testing. Therefore, there is a clear unmet need for a non-invasive test such as Breath Biopsy.

# EVOC Probes

Analysis of VOCs in exhaled breath represents an emerging diagnostic approach with the potential to develop safe, non-invasive tests for the early detection of NASH. Exhaled VOCs are low molecular weight compounds that can be endogenous, resulting from physiological or pathological metabolic processes, or exogenous VOCs (EVOCs), resulting from dietary or environmental exposure.

Owlstone Medical is using an EVOC approach whereby food supplements can be administered to elicit a response in subjects with liver disease. Initial research using limonene has demonstrated its utility in late-stage liver disease and development continues in early-stage disease. We are evaluating several alternative biological pathways using other EVOC probes to enhance the performance of our Breath Biopsy test for the early-stage detection and grading of NASH.



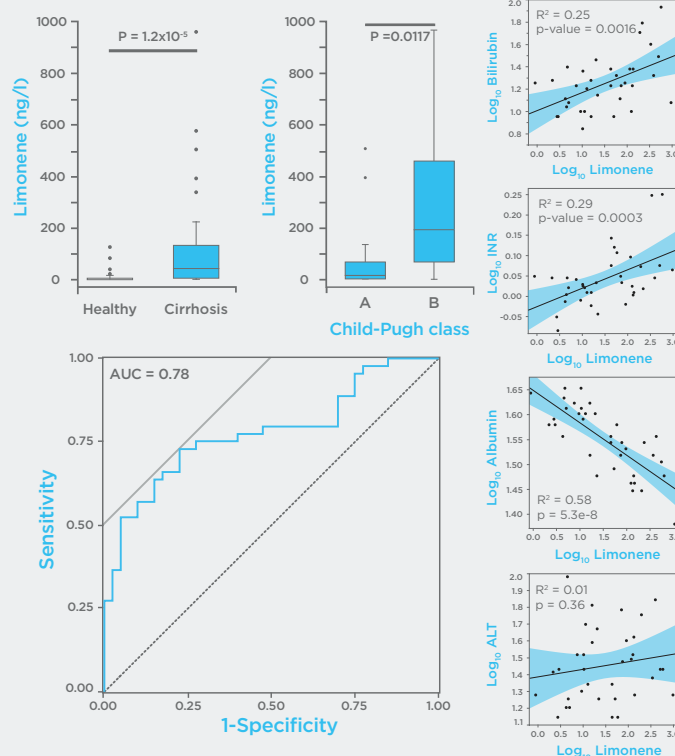
## Proof of Concept: Ferrandino et al. (2020)

Our work and that of others has shown that limonene is generally present at higher levels in breath samples from people with cirrhosis. Notably Fernandez del Rio et al. showed that a successful liver transplant can reduce the abundance of limonene on breath.

We've also seen that exhaled limonene correlates with blood biomarkers and the Child-Pugh measure of disease severity. This demonstrates that limonene has potential as an EVOC Probe for chronic liver diseases.

Scan to read the paper in full:

Ferrandino et al. (2020)  
*Clin Transl Gastroenterol*  
DOI: 10.14309/ctg.0000000000000239



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

[breathbiopsy@owlstone.co.uk](mailto:breathbiopsy@owlstone.co.uk)



Owlstone Medical Ltd, 183 Cambridge Science Park,  
Milton Road, Cambridge, CB4 0GJ, UK



@owlstonemedical

Company Number 04955647 | VAT Number 260449214

Owlstone Medical's Products and Services are for research use only. Not for use in diagnostic procedures.

BREATH  
BIOPSY