LIBRA®

For the earlier detection of liver cirrhosis

BREATH® BIOPSY

In the UK, there are more than 10,000 deaths due to liver disease each year[1]. That's more than 27 deaths a day. There has been a four-fold increase in death rates over the last 50 years.

Over the last decade, the number of liver disease-related hospital admissions in England has increased by 50%, placing an even greater strain on the health service, with ~£2.1 billion/year currently spent on treating liver disease[1].

Cirrhosis is often asymptomatic with 75% of diagnoses occurring in A&E[2] due to the advanced nature of the disease or accidental findings. Treatment options at these later stages can be limited.

Many existing tests have limitations in performance or economics which prevent widescale use in primary care, where the impact of earlier detection of cirrhosis is key.

The LIBRA® test is our patented innovative solution, enabling healthcare professionals to accurately screen for liver cirrhosis, including those at the highest risk (e.g., obesity, type 2 diabetes, viral hepatitis and high alcohol intake).

1 — 3 hours — 3 hours fasting before test

2 — 30 mins — Drink LIBRA® Oral Solution

3 — Within 3 working days — Breathe normally into device for 5 minutes

4 — Get results

The LIBRA® Oral Solution

Limonene (a compound we are normally exposed to through the diet) is elevated in the patients with cirrhosis[3-8] due to reduced liver function increasing the amount excreted into the lungs[4]. Our LIBRA® Oral Solution contains limonene to be given orally, allowing for the precise detection and quantification of breath limonene levels with our LIBRA® test.
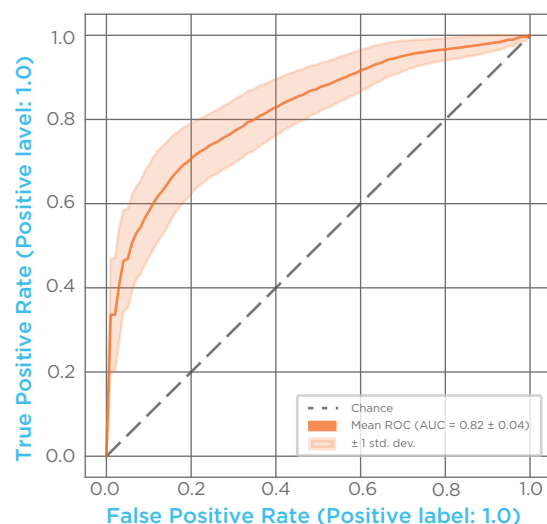
Why use the LIBRA® test?

- Accurate at ruling out cirrhosis (AUROC 0.91)[6]
- Non-invasive
- Fast results
- Easy to collect a breath sample

See the test being performed

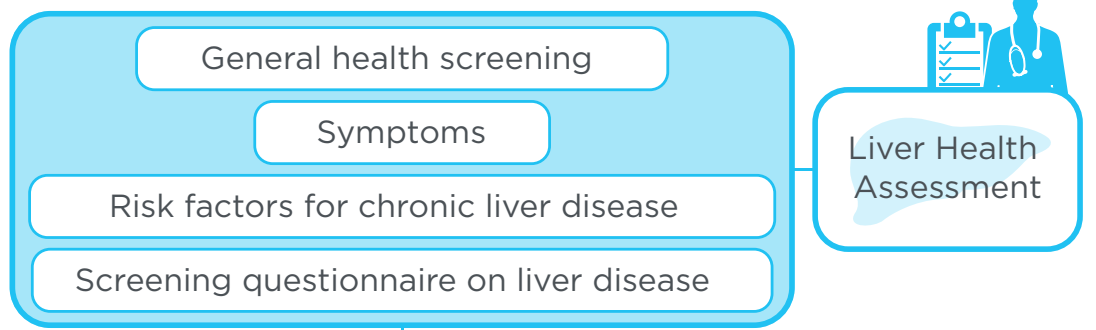### AUROC for Cirrhosis vs Pre-cirrhosis at 30 minutes

True Positive Rate (Positive lavel: 1.0) vs False Positive Rate (Positive label: 1.0)

- - - Chance
— Mean ROC (AUC = 0.82 ± 0.04)
± 1 std. dev.

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https://www.owlstonemedical.com/contact/

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BREATH® BIOPSY

Liver Health Assessment

General health screening

Symptoms

Risk factors for chronic liver disease

Screening questionnaire on liver disease

LIBRA®

Low risk of having cirrhosis

≤470 ng limonene in breath
Sensitivity: 0.63
Specificity: 0.80

High risk of having cirrhosis

>470 ng limonene in breath
Sensitivity: 0.63
Specificity: 0.80

Recommend referring to hepatologist

Case Study: Subject 10297

A subject enrolled as a control showed no altered blood metrics of liver function. However, an abnormal limonene breath profile was observed. Additional diagnostic work-up established this subject in fact had liver damage. The LIBRA® test caught a misassigned control case that had liver damage where blood tests failed to catch them. Additional follow-up was recommended.

Parameter	Result from subject 10297	Reference range
Platelets (number/μL)	252000	150000-400000
Bilirubin (mg/dL)	0.5	0.1-1.2
Albumin (g/dL)	4.4	3.5-5.5
INR	1.1	≤1.1
AST (U/L)	29	8-33
ALT (U/L)	25	7-56
Creatine (μmol/L)	0.72	0.7-1.3
ALP (IU/L)	105	44-147

Sample LIBRA® Test Report

TEST REPORT:
LIBRA® TEST

LIBRA® **OWLSTONE MEDICAL**

PATIENT INFORMATION:
Surname: Shaw
Forename: Rachel
Date of Birth: 12/12/2002
Clinic Reference Number: YYYYYY
Sample Number: ABC123456

TEST INFORMATION:
Test Requestor: Dan Mead
Clinic Name: A Clinic
Clinic Address: Street, town, postcode
Date of Test: 12/12/2024
Date of Report: 12/12/2012

TEST RESULTS

AMOUNT OF LIMONENE: 980 ng　　　　　　**HIGH RISK**

Thresholds:
≤470 ng limonene: *Low risk of Liver Cirrhosis.* Specialist referral is not recommended.
>470 ng limonene: *High risk of Liver Cirrhosis.* Specialist referral recommended.

Disclaimer: The results of the LIBRA® test should not be used as the sole basis for ruling out or diagnosing liver cirrhosis. A definitive diagnosis and treatment plan must be determined by a qualified healthcare professional.

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References
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4. Fernandez Del Rio, R. et al. Volatile Biomarkers in Breath Associated With Liver Cirrhosis - Comparisons of Pre- and Post-liver Transplant Breath Samples. EBioMedicine 2, 1243-1250, doi:10.1016/j.ebiom.2015.07.027 (2015).
5. Ferrandino, G. et al. Breath Biopsy((R)) to Identify Exhaled Volatile Organic Compounds Biomarkers for Liver Cirrhosis Detection. J Clin Transl Hepatol 11, 638-648, doi:10.14218/JCTH.2022.00309 (2023).
6. Ferrandino, G. et al. Exogenous Volatile Organic Compound (EVOC((R))) Breath Testing Maximizes Classification Performance for Subjects with Cirrhosis and Reveals Signs of Portal Hypertension. Biomedicines 11, doi:10.3390/biomedicines11112957 (2023).
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8. Stavropoulos, G. et al. Liver Impairment-The Potential Application of Volatile Organic Compounds in Hepatology. Metabolites 11, doi:10.3390/metabo11090618 (2021).