Dynamic Limonene Breath Testing Maximizes Classification Performance for Subjects with Cirrhosis


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Aims

1. Background and Objectives

- Assess diagnostic performance of a dynamic limonene breath test for cirrhosis detection.
- Identifying compounds with low hepatic extraction to assess their accuracy in reporting on metabolic alterations.
- Explore the correlation of limonene bioavailability with cirrhosis.

2. Methods

- Dynamic limonene breath testing maximizes classification performance for subjects with cirrhosis.
- Figure 1: Graphical Summary of Unadjusted Models’ Performance (with SDs).
- Figure 2: Graphical Summary of Adjusted Models’ Performance (with SDs).
- Figure 3: Subjects found to have been allocated in the wrong group after pairwise correlation of liver condition. Ultrasound image of a subject who received a diagnosis of cirrhosis by enrolling in this study, and initially allocated as healthy (A). Ultrasound image of a subject diagnosed with cirrhosis three years before the breath tests, who showed recovery after treatment (B). Breath profile of these subjects. Shaded area represents the 95% confidence interval for the cirrhosis group (blue) and control (grey) for comparison. Each line represents a subject (C).

3. Results

- Figure 4: After overnight fasting, subjects with cirrhosis showed significantly elevated levels of breath limonene as expected (A). Limonene administration induced a spike on breath with significantly higher levels in subjects with cirrhosis at all the tested timepoints (B). A higher limonene bioavailability was induced a spike on breath with significantly higher levels in subjects with cirrhosis at all the tested timepoints (C).

4. Conclusions and Next Steps

- Dynamic breath analysis enhances classification performance for cirrhosis opens up the opportunity to implement a reliable test in primary care.
- Alterations of limonene breath kinetics in cirrhosis resemble the changes induced by drugs with high hepatic extraction.
- Correlation of limonene with disease severity suggests applications for non-invasive monitoring of therapeutic intervention.
- Identify additional compounds with low hepatic extraction to assess their accuracy in reporting on metabolic alterations.
- Explore applications for disease progression and regression.
- Investigate similar approaches in earlier stages of liver disease such as non-alcoholic steatohepatitis (NASH).

References


