



Impact of The North American Consensus on Hydrogen and Methane-Based Breath Testing for Carbohydrate Malabsorption

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INTRODUCTION

- Breath tests are a useful and non-invasive tool for the diagnosis of carbohydrate malabsorption (CM) syndromes such as lactose and fructose maldigestion/intolerance.
- The acquisition parameters and interpretation of breath testing data for the assessment of CM varies widely between centres throughout the UK.
- The recently published North American Consensus (NAC) document on hydrogen and methane-based breath testing (HMBT) was a first attempt to standardise this diagnostic test.¹
- The NAC proposed several key recommendations for CM breath testing:¹
 - Extend the minimum period of post ingestion breath sampling from 120 to 180-minutes.
 - Exclude the presence of Small Intestinal Bacterial Overgrowth (SIBO) prior to CM testing.
 - Dosage of substrate for fructose and lactose should be 25g in one cup of water.
- To examine the impact of these recommendation results we retrospectively assessed our breath test database of CM studies from the previous 12-months.

METHODS

- In total 200 subjects were analysed (120-lactose and 80-fructose) from our breath test database between July 2016 and September 2017.
- If the subject had more than one CM breath test only the first was included in the data analysis.
- Patient data was retrospectively attributed to 120-min and 180-min groups for both lactose and fructose breath tests.
- Subjects followed a strict 12h low fibre diet and successive 12h fast prior to carrying out a HMBT.
- All patients provided a baseline sample prior to ingestion of substrate being 25g of lactose or fructose and 10g of lactulose or 75g of glucose for CM and SIBO, respectively.
- A rise in hydrogen ≥ 20 ppm above baseline was considered positive for CM.¹
- A positive test for SIBO was determined by a rise in hydrogen ≥ 10 ppm above baseline within 60 minutes after ingestion of substrate.
- Data was analysed statistically using descriptive statistics and association between SIBO and an early CM-positive result was analysed using Pearson's chi-squared test

RESULTS

- A positive result for CM at 120-min was seen in 27 of 120 (22.5%) subjects for lactose and 33 of 80 (36.3%) subjects for fructose.
- When extended to 180-min the number of positive CM tests increased to 30% and 41.3% for lactose and fructose, respectively.
- Within these groups the significant rise in gas levels occurred at ≤ 60 minutes after ingestion in 34.3% for lactose and 69.8% for fructose.
- There was a significant association between patients who had a positive breath test for SIBO and a positive breath test for lactose at ≤ 60 minutes [$\chi^2=5.3$, $p<0.02$]. Findings for fructose were not significant [$p>0.05$].
- The NAC decision to change dosage to 25g could not be assessed because 25g was used as standard for all of our CM tests.

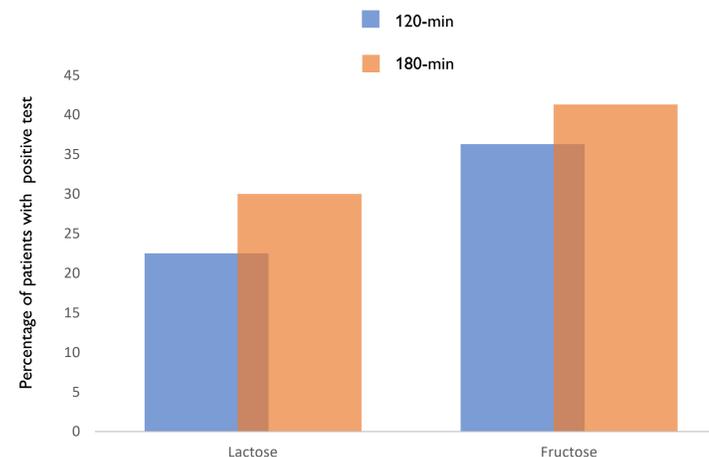


Figure 1. The effect of study time on CM breath test results

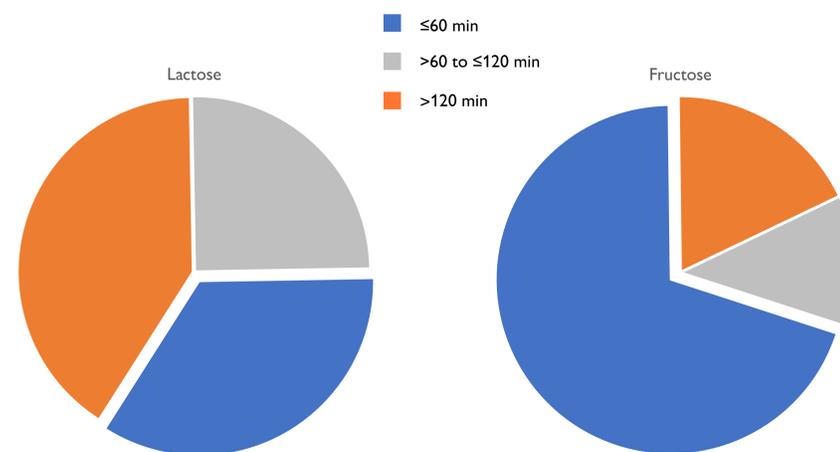


Figure 2. Time of significant rise in ≥ 20 ppm hydrogen post-ingestion in CM positive breath tests. A rise within ≤ 60 min was associated with a positive SIBO breath test for lactose ($\chi^2=5.3$, $p=0.02$) but not fructose ($p>0.05$)

CONCLUSION

- Around 20% of the positive results for CM occurred after 120 minutes supporting the NAC position to extend the post ingestion period to at least 180 minutes to avoid false negative studies.
- SIBO may influence CM results for lactose thus a lactulose or glucose HMBT should be performed prior to CM testing to avoid false positive tests, which supports the NAC findings.²
- Almost half of the subjects who carried out a fructose malabsorption HMBT were positive for fructose maldigestion. Furthermore, 70% of this sub-group had positive result within 60 min of ingestion, but this was not associated with SIBO, as similar studies have shown.³ The relationship between the high prevalence of fructose intolerance, transit time and intestinal microbiota requires more research.
- Like the first iteration of the Chicago Classification for oesophageal motility testing – the NAC on breath testing represents a positive first step in standardising diagnostic breath testing.

TAKE-HOME MESSAGE

Breath tests for CM should be carried out for at least 3 hours to avoid false negative results. A breath test to exclude SIBO should be performed prior to CM testing to avoid false positive results. If SIBO positive, a CM breath test for lactose should not be considered until after SIBO has been treated.

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