



Hydrogen and methane breath tests

an improved test for detecting carbohydrate malabsorption and small intestinal bacterial overgrowth

Dr. Penny Neild MD FRCP
Consultant Gastroenterologist

Hydrogen breath tests have been in use for many years, either for the detection of malabsorption of various dietary sugars (e.g. lactose, fructose), or in the diagnosis of small intestinal bacterial overgrowth. However, it is recognised that there are a significant number of individuals (15-30%), who may have a false negative result due to the fact that they produce gases such as methane rather than hydrogen. Parkside is delighted to introduce a new combined hydrogen and methane breath test, which can not only detect a higher number of people with malabsorption but is also available for use in the comfort of the patient's own home.

What is a hydrogen/methane breath test?

The test is based on breath hydrogen and methane analysis and provides information about the digestion of certain sugars or carbohydrates, e.g. lactose or fructose. The pattern and quantity of hydrogen produced in exhaled breath at intervals during the test will help determine if individuals have difficulty in processing or absorbing certain sugars. As about 30% of the population do not exhale hydrogen in measureable quantity, the combined hydrogen/methane test is considered to be the gold standard among breath tests at present.

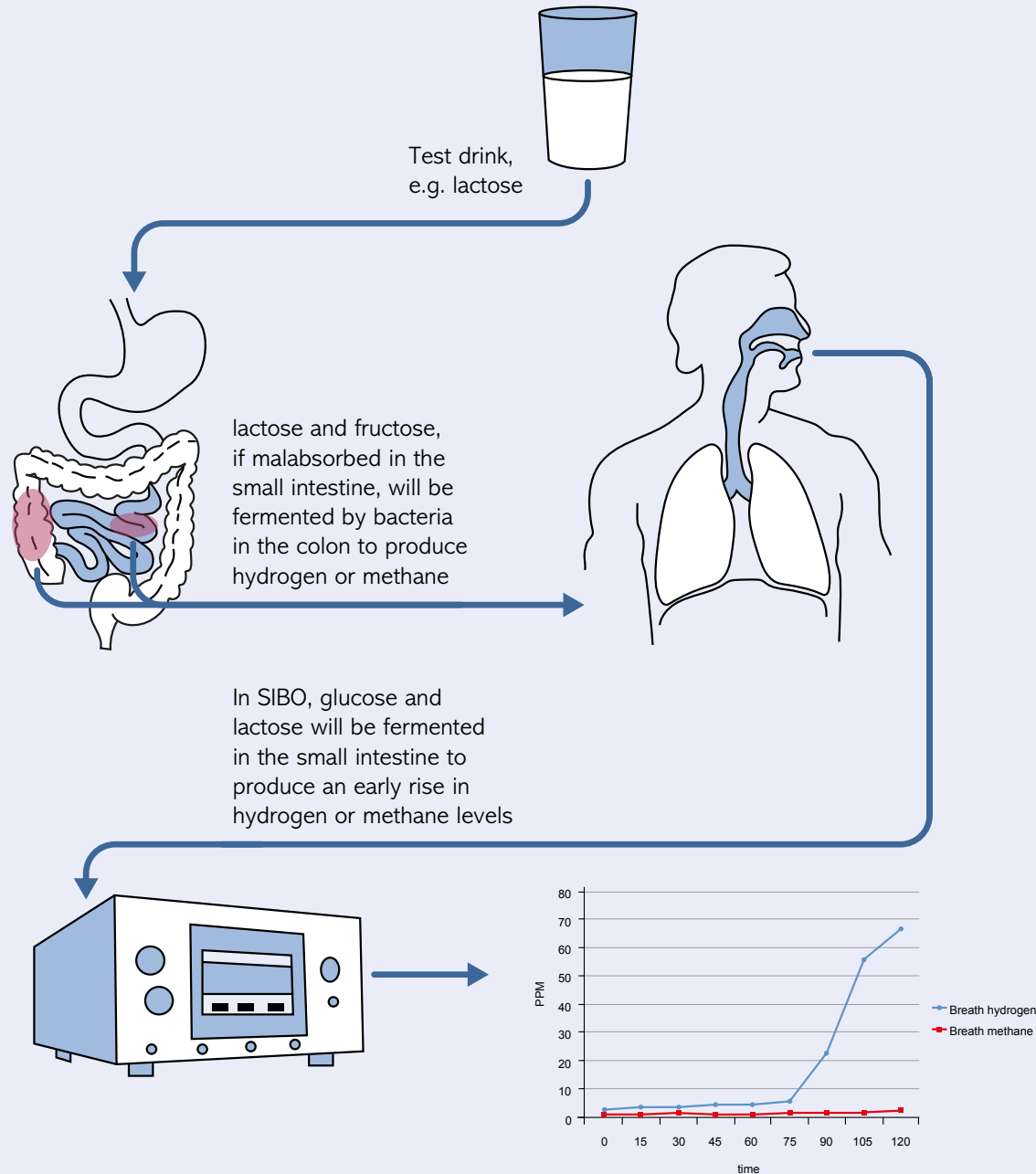
Parkside is delighted to introduce a new combined hydrogen and methane breath test

How does it work?

Gaseous hydrogen and methane are produced by intestinal bacteria. In normal circumstances, exhaled breath contains little or no hydrogen; individuals break down and absorb sugars such as lactose, fructose or glucose within the first one third of the small bowel, which contains relatively low quantities of microbes. However, a number of adults develop a reduced ability to process and absorb certain sugars in the small intestine. They are therefore carried forward to the colon where they are metabolised by colonic bacteria, producing significant quantities of hydrogen and/or methane, which, after absorption across the intestinal mucosa into the bloodstream is transported to the lungs, where it can be measured in the breath.

In situations of small intestinal bacterial overgrowth (SIBO), fermentation of all sugars occurs in the small bowel, relatively soon after ingestion, which again leads to gas production, often excreted from the lungs within 30-60 minutes.

Figure 1 shows an overview of this process.



Who may benefit from being referred for breath tests?

There are a number of gastrointestinal symptoms, which may arise from the malabsorption of sugars, and consequent production of excessive gas in the large bowel. These are often noted in association with irritable bowel syndrome and include:

- Abdominal bloating
- Wind
- Abdominal cramping
- Flatulence
- Rumbling
- Loose stools
- Nausea

Some people also report other symptoms when they eat foods containing sugars that they are unable to digest. Some examples include:

- Headache
- Fatigue
- Restlessness or irritability
- Dizziness
- Cold or heat sensations/tingling

Patients with SIBO, in addition to the above symptoms, may present with weight loss, anaemia and low levels of Vitamin B12, in conjunction with high serum folate levels.

Individuals at risk of developing SIBO include:

- neuromuscular conditions affecting gastrointestinal motility (e.g. diabetes, scleroderma)
- conditions associated with partial/intermittent intestinal obstruction (e.g. inflammatory bowel disease, previous bowel surgery, adhesions)
- conditions associated with immunosuppression, including chemotherapy and post radiotherapy

What is entailed in having a breath test?

Patient preparation

- Pro-motility and anti-motility drugs, probiotics, antibiotics and other drugs that can cause SIBO including proton pump inhibitors should be discontinued before performing breath tests.
- Patients are asked to avoid slowly absorbed carbohydrates (like bread and potato) and high fibre foods for two days before the test as these may cause delayed excretion of hydrogen in breath
- Cigarette smoking and exercise are avoided immediately before and during the test, as hyperventilation can cause changes in breath hydrogen content.
- The test is performed after an overnight fast. On the morning of the test, subjects are asked to brush their teeth and rinse mouth with antiseptic mouth wash, to reduce the risk of an early hydrogen peak due to action of oral bacteria on the test sugars

Procedure of the Breath Test

On arrival at the Day Unit at Parkside Hospital, after completion of a brief pre-test questionnaire, the individual will then be asked to breathe out into a bag to collect the first breath hydrogen/methane sample (see figure 2). After drinking the test sugar solution (e.g. 25g lactose) further breath samples will be collected every 15 to 30 minutes for the next 2-3 hours, depending on the results being obtained or information required. Patients will be asked to rate their symptoms at the time of each breath sample.

Alternatively a test kit can be sent to the patient's home together with a DVD on how to perform the test. They can then undertake the test at their own convenience and return the specimen bags to us (see figure 3).

A full report, including symptom and breath hydrogen analysis and interpretation, will be sent to both patient and referring doctor within one week of the test.

Are there any risks or side effects?

The test is very safe, and, apart from the possible reproduction of some or all of the patient's symptoms for a short time, has no significant side effects or risks.

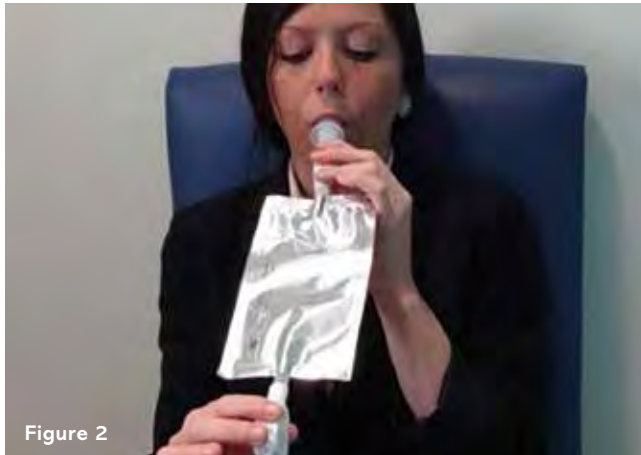


Figure 2

Interpretation of breath tests

Figure 4 shows some examples of typical results from breath tests. A significant rise in levels of breath hydrogen and/or methane (>20 PPM over baseline) in conjunction with a change in symptoms strongly suggests malabsorption of the test sugar.

However, there may be circumstances where the results are less clear-cut and should therefore be interpreted with caution. These include the following:

- an early rise in gas levels may be interpreted as SIBO but may also be seen in
 - patients with abnormally fast small intestinal transit and small intestinal malabsorption of test sugar
 - patients who have not adhered to advice re pre-test dietary restrictions
- a lack of increase in gas levels may be interpreted as a negative test, but may also be seen in
 - patients with small intestinal malabsorption of test sugar but unduly prolonged small intestinal transit time
 - a very small number of patients who may produce gas other than hydrogen or methane as a result of bacterial fermentation
- high baseline levels of hydrogen and/or methane
 - it has been suggested that this indicates SIBO, but may also occur when patients have not adhered to advice re pre-test dietary restrictions



Figure 3

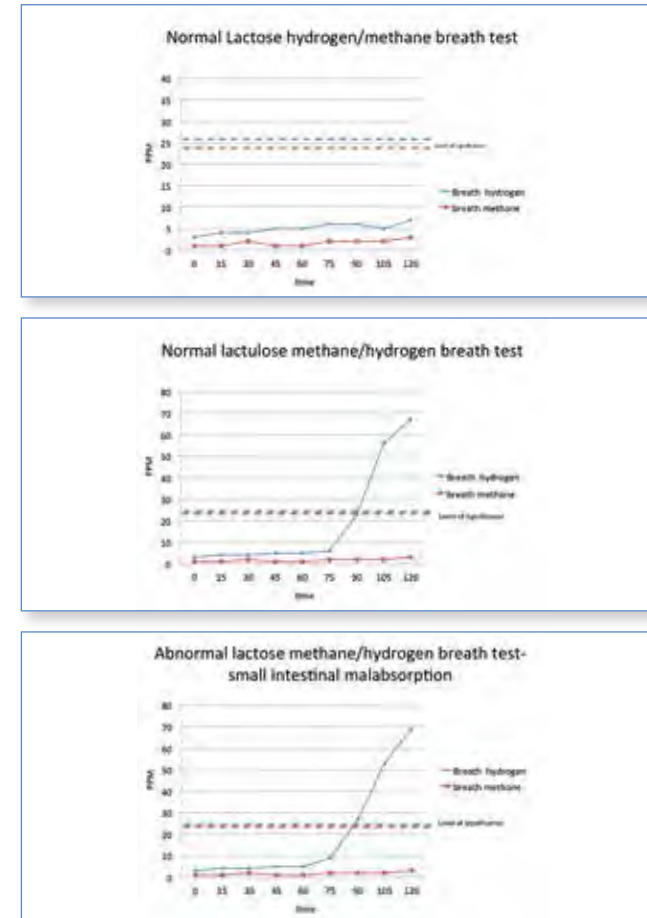


Figure 4 - Examples of methane/hydrogen breath test results

What is the significance of a positive breath test for patients?

In breath tests, which indicate small intestinal malabsorption of specific sugars and associated with increasing gastrointestinal symptoms, patients may benefit from dietetic advice and/or trial of a low FODMAPs diet. It should be noted, however, that a number of individuals poorly absorb carbohydrates such as lactose, with no clinical ill effects and do not require dietary restriction.

In breath tests, which indicate small intestinal bacterial overgrowth (SIBO), patients may benefit from referral to a gastroenterologist, and/or a trial of antibiotic therapy (e.g. rifaxamin).