Dorevitch PATHOLOGY

GUT FEELING

GASTROLAB NEWS FOR GPs
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Dorevitch Pathology's Gastrolab GUT DIAGNOSIS

The Importance of Methane Breath Testing

Malabsorption of dietary sugars, such as lactose and fructose commonly leads to symptoms of irritable bowel syndrome such as bloating, cramps, and diarrhoea. The hydrogen breath test is now a well-established non-invasive test for assessing malabsorption of sugars in the small intestine, and for the detection of small intestinal bacterial overgrowth (SIBO). There are patients however, who can suffer from the same spectrum of malabsorption issues but who produce little or no hydrogen, instead producing relatively large amounts of methane. This issue of the so-called "low/non-hydrogen producer" has been reviewed in a recent publication by Costello *et al* [1].

Clinical Notes : Clinical Notes:

HYDROGEN / METHANE BREATH TEST

Date	Time (mins) (0)	(30)	(60)	(90)	(120)	(150)	(180)	
06/11/14 Fructose								
(H2)	0		48		12		7	*
(CH4)	47		51		35		39	
Symptoms: 2-Abdominal pain 3-Flatulence								
07/11/14 Lactose								
(H2)	0		2		0		2	
(CH4)	52		46		42		45	
Symptoms: None reported								

Consistent with fructose malabsorption after 35g fructose challenge.

No evidence of lactose malabsorption after 25g lactose challenge.

Hydrogen (H2) and methane (CH4) is corrected for CO2 concentration in the expired alveolar sample and expressed in parts per million (ppm). To reduce false negatives, breath CH4 is used as an important alternative measure in the subgroup of H2 non-producers. Positivity is indicated by rise above baseline.

Low-hydrogen producers

Low-hydrogen producers will avoid detection with the traditional breath test for malabsorption based on breath hydrogen detection alone. Therefore, a number of false negatives would be expected for patients who solely produce methane. Usually patients produce either hydrogen or methane, and only rarely are there significant co-producers, as one atom of methane (CH_4) is produced at the expense of four atoms of hydrogen (H) by microbial conversion. Costello estimates that methanogens occur in about a third of all adult humans, the most common species being *Methanobrevibacter smithii;* therefore, there is significant potential for malabsorbers to remain undiagnosed if a simple hydrogen breath test is used. As an example, the hydrogen-based lactose malabsorption test is considered to result in about 5–15% false negatives mainly due to methane production. Certainly here at **Gastrolab** we have prospectively studied the prevalence of low-hydrogen producers, based upon >2000 consecutive lactulose hydrogen-breath tests, and found that approximately 30% of our patients were low-hydrogen producers, which is consistent with reports in the medical literature [2,3]. These patients have then gone on subsequently to have methane breath testing done, minimising false negative results.

Breath methane measurement and CO_2 correction factor

Methane measurements were once only in the domain of research laboratories, unlike hydrogen measurements which can now be readily undertaken due to the invention of reliable electrochemical hydrogen sensors. **Gastrolab** is one of the few breath test providers in Australia that utilises validated gold standard gas chromatograph instrumentation to measure breath methane (in addition to standard hydrogen breath testing) [4]. Further, this instrumentation has an inbuilt correction factor for breath CO_2; a reading with an abnormally high CO_2 concentration suggests improper sampling (contamination with atmospheric air and/or significant dead volume), or sample leakage. This is particularly important for children where the quality of the sample collection can be quite variable. This makes more widespread and accurate clinical testing a realistic possibility. Costello commented that the production of small

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amounts of hydrogen and/or methane does not normally produce symptoms, whereas the production of higher levels can lead to a wide range of symptoms ranging from functional disorders of the bowel to low level depression. In conclusion, the sequential (or combined) measurement of hydrogen and methane should offer considerable improvement in the diagnosis of malabsorption syndromes and SIBO when compared with a single hydrogen breath test.

Gastrolab comment

At **Gastrolab** we recommend all patients have a baseline lactulose hydrogen breath test done for the following reasons: 1) it allows us to identify low-hydrogen producers, so that their subsequent tests can be undertaken measuring breath methane production; 2) it may aid in the diagnosis of rapid-transit diarrhoea, based upon the estimated oro-caecal transit time; 3) it may provide some evidence of SIBO, especially ileal bacterial overgrowth; and 4) as lactulose is 100% malabsorbed, the peak gas production can be used by dieticians to estimate the degree of malabsorption of other sugars such as fructose and lactose by comparing the relative peak gas production.

In our next edition....

Our next edition of *Gut Feeling* will focus on children, presenting a number of recent studies exploring the role of carbohydrate malabsorption and the application of breath testing in the paediatric population. We will also discuss a number of strategies we have come to use to successfully complete breath testing on our younger patients.

Gastrolab offers breath testing to children of all ages - the only limitations being their willingness to supply us with a breath sample! We have found that our home breath kits can be extremely useful for testing children, particularly the younger children who find a visit to the clinic or doctor confronting

References

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3. B Braden, 2009. *Best Pract Res Clinc Gastroenterol.* 23(3):337-52
4. WS Lee *et al.,* 2000. *J Paediatric Child Health.* 36(4):340-2

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