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Lactose Hydrogen Breath Test Methods

Description of Procedure:

The fermentation of nonabsorbed carbohydrates exposed to certain intestinal bacterial results in the production of hydrogen (H₂) gas within the intestinal lumen, a fixed portion of which is reabsorbed and excreted by the lungs. Approximately 21% of the colonic H₂ gas is excreted by the pulmonary route. The breath H₂ lactose test is a commonly employed test and is very useful in determining functional lactose tolerance in vivo as compared to direct biopsy test for lactase enzyme activity. Absorption of other carbohydrates or simple sugars including sucrose and xylose also could be studied using this method. The major limitation of H₂ breath tests is the absence of H₂ producing bacteria in the microflora of up to 20-25% of subjects. This can be controlled for by orally administering a large dose of non-absorbable disaccharide lactulose as a second part of a normal or "non-reactive" H₂ breath test. This test is positive for malabsorption if one shows a 20 ppm rise above fasting baseline H₂ gas levels after ingestion of lactose. This simple noninvasive test is reliable and has replaced the older blood glucose lactose test and/or small bowel biopsy and lactose enzyme assay techniques.

Patient selection:

A. INDICATIONS:

1. Patients suspected of lactose intolerance
2. Irritable Bowel Syndrome

B. CONTRAINDICATIONS:

1. Hypersensitivity to lactose

Preparation:

A. Patient Preparation:

1. NPO after midnight prior to exam
2. No smoking or teeth brushing morning of exam
3. No mechanical bowel cleansing or antibiotic use one month prior to exam
4. Plan to stay for a four hours
5. Low lactose, low carbohydrate, low fiber dinner the day prior to exam

Breath Testing Methods:

There are two different methods for performing the test with the new H₂ Check.

1. Have the patient place their lips around the cardboard mouthpiece and breath in and out deeply ensuring the lungs are fully emptied. They should continue breathing for one minute until you hear the beep.
2. Start the 10 seconds countdown timer and ask the patient to start holding their breath. When the timer reaches zero the blow icon will be displayed. Have the patient blow gently and continuously until their lungs are completely empty.

Have the nurse demonstrate if the patient is having a hard time understanding the procedure.

Interpretation and Results:

1. Lactose Maldigestion: 20 ppm H₂ gas rise above fasting baseline, after 25-50 grams lactose challenge.
2. Lactose Intolerance: symptoms including gas, flatus, borborygmi, abdominal discomfort, diarrhea or cramps.
3. False Positives: small bowel bacterial overgrowth and non fasting patient.
4. Avoid testing patients who have undergone mechanical bowel cleansing (prior 30 days), antibiotic use or severe diarrhea. No smoking or sleeping during test.

Selected Readings:

1. Levitt MD, Production and excretion of hydrogen in man, N Engl J Med 1969;281:122
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3. Solomons NW, Hamilton LH, Christman NT, Rothman E, Evaluation of a rapid breath hydrogen analyzer for clinical studies of carbohydrate absorption. Dig Dis Sci 1983; May 28(5):397-404
4. King CE, Toskes PP, The use of breath tests in the study of malabsorption, Clin Gastroenterol 1983;12:591-610
5. Gilat, T. BenHur H, Gelman-Malachi E, et al., Alterations for the colonic flora and their effect on the hydrogen breath test; Gut 1978 :19 :602-605
6. Barr RG, Watkins JB, Perman JA, Mucosal function and breath hydrogen excretion-comparative studies in the clinical evaluation of children with nonspecific abdominal complaints; Pediatrics 1981;68:526-533
7. DiPalma JA, Narvaez RM, Pierson WP, Prediction of lactose malabsorption in referral patients; Dig Dis Sci 1988;33:303-7.