Hydrogen breath tests

Modern, non-invasive functional diagnostics in gastroenterology includes a number of breath tests based on measuring the concentration of hydrogen in exhaled air. The concentration of hydrogen H_2 in the exhaled air increases in direct proportion to the hydrolysis of the administered substrate. After administration of the test substrate, exhaled air samples are taken and the hydrogen concentration is determined by gas chromatography or using very simple hand-held, battery analyzers (H_2-monitors) with an electrochemical sensor, which are routinely used in pediatrics in differential diagnosis of malabsorption syndrome. Lactose may be a suitable substrate (for the diagnosis of lactose intolerance), sucrose, sorbitol, fructose, glucose or even D-xylose, which was previously commonly used for the D-xylose absorption test.

The applications of hydrogen breath tests cover a wide area. In addition to the mentioned differential diagnosis of malabsorption syndrome, it is the syndrome of bacterial overgrowth in the small intestine (SBBO, the substrate is for example D-xylose), determination of gastrointestinal motility, orocecal transit time (OCCT, substrate is for example inulin) - small bowel transit time (SBTT) also referred to as LHBT (the substrate provided is lactulose), or the quality of the colon preparation before endoscopic examination. The gastrointestinal passage time is an important data for the evaluation and interpretation of other functional tests, and is therefore often combined with other breath tests, for example 13C/H_2 - lactose test, which evaluates the enzymatic cleavage of lactose (the marker is carbon 13C) and at the same time as a correction of motility, passage is used bacterial cleavage in the large intestine (the marker is H_2).

Links

Sources

- se svolením autora převzato z KOCNA, Petr. *GastroLab : MiniEncyklopedie laboratorních metod v gastroenterologii* [online]. ©2002. Poslední revize 2011-01-08, [cit. 2011-03-04]. <http://www1.lf1.cuni.cz/~kocna/glab/glency1.htm>.
- RAO, SS, et al. Ability of the normal human small intestine to absorb fructose: evaluation by breath testing. *Clin Gastroenterol Hepatol.* 2007, vol. 5, no. 8, s. 959-63, ISSN 1542-3565 (Print), 1542-7714 (Electronic). PMID: 17625977
- SCHNEIDER, AR, et al. The inulin hydrogen breath test accurately reflects orocaecal transit time. *Eur J Clin Invest.* 2007, vol. 37, no. 10, s. 802-7, ISSN 0014-2972 (Print), 1365-2362 (Electronic). PMID: 17727672.
- DICAMILLO, M, et al. Hydrogen breath test for diagnosis of lactose malabsorption: the importance of timing and the number of breath samples. *Can J Gastroenterol.* 2006, vol. 20, no. 4, s. 265-8, ISSN 0835-7900 (Print). PMID: 16609755.
- NUCERA, G, et al. Abnormal breath tests to lactose, fructose and sorbitol in irritable bowel syndrome may be explained by small intestinal bacterial overgrowth. *Aliment Pharmacol Ther.* 2005, vol. 21, no. 11, s. 1391-5, ISSN 0269-2813 (Print), 1365-2036 (Electronic). PMID: 15932370.
- OWIRA, PM, et al. Comparison of inulin and lactulose as reference standards in the breath hydrogen test assessment of carbohydrate malabsorption in patients with chronic pancreatic exocrine insufficiency. *Dig Dis Sci.* 2005, vol. 50, no. 6, s. 1058-63, ISSN 0163-2116 (Print), 1573-2568 (Electronic). PMID: 15986854.
- WALTERS, B, et al. Detection of bacterial overgrowth in IBS using the lactulose H2 breath test: comparison with 14C-D-xylose and healthy controls. *Am J Gastroenterol.* 2005, vol. 100, no. 7, s. 1566-70, ISSN 0002-9270 (Print), 1572-0241 (Electronic). PMID: 15984983.
- SYMONDS, EL, et al. A combined 13CO2/H2 breath test can be used to assess starch digestion and fermentation in humans. *J Nutr.* 2004, vol. 134, no. 5, s. 1193-6, ISSN 0022-3166 (Print), 1541-6100 (Electronic). PMID: 15113969.
- URITA, Y, et al. Hydrogen breath test as an indicator of the quality of colonic preparation for colonoscopy. *Gastrointest Endosc.* 2003, vol. 57, no. 2, s. 174-7, ISSN 0016-5107 (Print), 1097-6779 (Elestronic). PMID: 12556779.
- PARLESAK, A, et al. Prevalence of small bowel bacterial overgrowth and its association with nutrition intake in nonhospitalized older adults. *J Am Geriatr Soc.* 2003, vol. 51, no. 6, s. 768-73, ISSN 0002-8614 (Print), 1532-5415 (Electronic). PMID: 12757562.
- GEBOES, KP, et al. Inulin is an ideal substrate for a hydrogen breath test to measure the orocaecal transit time. *Aliment Pharmacol Ther.* 2003, vol. 18, no. 7, s. 721-9, ISSN 0269-2813 (Print), 1365-2036 (Electronic). PMID: 14510746.
- CASELLAS, F, et al. Applicability of short hydrogen breath test for screening of lactose malabsorption. *Dig Dis Sci.* 2003, vol. 48, no. 7, s. 1333-8, ISSN 0163-2116 (Print), 1573-2568 (Electronic). PMID: 12870791.
- CHOI, YK, et al. Fructose intolerance: an under-recognized problem. *Am J Gastroenterol.* 2003, vol. 98, no. 6, s. 1348-53, ISSN 0002-9270 (Print), 1572-0241 (Electronic). PMID: 12818280.
- MURPHY, MS, et al. Use of the lactose H2 breath test to monitor mucosal healing in coeliac disease. *Acta Paediatr.* 2002, vol. 91, no. 2, s. 141-4, ISSN 0001-656X. PMID: 11951999.
- TURSI, A, et al. Sorbitol H2-breath test versus anti-endomysium antibodies to assess histological recovery after gluten-free diet in coeliac disease. *Dig Liver Dis.* 2002, vol. 34, no. 12, s. 846-50, ISSN 1590-8658 (Print), 1878-3562 (Electronic). PMID: 12643292.
- CASELLAS, F, et al. Hydrogen breath test with D-xylose for celiac disease screening is as useful in the elderly as in other age groups. *Dig Dis Sci.* 2001, vol. 46, no. 10, s. 2201-5, ISSN 0163-2116 (Print), 1573-2568 (Electronic). PMID: 11680597.
- LEE, WS, et al. Analysis of the breath hydrogen test for carbohydrate malabsorption: validation of a pocket-

sized breath test analyser. *J Paediatr Child Health.* 2000, vol. 36, no. 4, s. 340-2, ISSN 1034-4810 (Print), 1440-1754 (Electronic). PMID: 10940167.