10. Institute of Medicine Subcommittee on Standardized Collection of Race/Ethnicity Data for Healthcare Quality Improvement. In: Ulmer C, McFadden B, Nerenz DR, eds. Race, ethnicity, and language data: standardization for health care quality improvement. Washington (DC): National Academies Press (US); 2009.
11. Coronavirus DC Data 2020. https://coronavirus.dc.gov/page/coronavirus-data. Accessed December 2, 2020.
12. Schwamm LH, Erskine A, Licurse A. A digital embrace to blunt the curve of COVID19 pandemic. NPJ Digit Med 2020;3:64.

50 Years Ago in *The Journal of Pediatrics*

The Wind of Change in Lactose Malabsorption Diagnostics: From Invasive Tolerance Tests to Hydrogen Breath Tests

Varavithya W, Valyasevi A, Charuchinda S. Lactose Malabsorption in Thai Infants. J Pediatr 1971;78:710-5.

The 1970s marked an era of development of noninvasive modalities for diagnosing lactose malabsorption, a common pediatric problem with a worldwide prevalence of 68%.[1] Healthy infants have abundant lactase activity to digest the main sugar in milk, lactose, to glucose and galactose. The enzyme activity gradually decreases in early childhood, especially in preschool aged children, as shown in numerous epidemiological studies.[2] In 1971, Varavithya et al focused on the prevalence of lactose malabsorption in a cohort of malnourished Thai infants using both the lactose tolerance test and the glucose-galactose tolerance test. In both modalities, children are given a predetermined amount of the respective sugars orally after a period of fasting with frequent blood draws at 20 minute intervals over a 2-hour period. Lactose, glucose, or galactose malabsorption is shown by an increase in the serum blood sugar of less than 20 mg/dL.

Levitt introduced the concept of breath hydrogen generation during lactose fermentation in adults, which eventually changed the clinical diagnostics of lactose malabsorption.[3] The concept led to the development of the noninvasive lactose hydrogen breath test, often used in cooperative young children able to drink a formulation of lactose and exhale when asked to do so. Bacteria ferment the malabsorbed sugar when given orally to produce hydrogen and methane, which is then exhaled. Patients with an increase of more than 20 ppm of hydrogen in exhaled air within 3 hours are determined to have lactose malabsorption, with 77.5% sensitivity and 97.6% specificity.[1,4] The test can include simultaneous symptom assessment of abdominal pain, bloating, flatulence, and diarrhea. In the late 1970s, lactase activity was also assessed on duodenal biopsy samples obtained during esophagogastroduodenoscopy. The procedure is not indicated for the sole reason to test for lactose malabsorption owing to its invasive nature and the need for anesthesia. Moreover, low tissue enzyme levels correlate poorly with patient-specific symptoms. Genetic testing can detect polymorphism if present, but also fails to allow symptom assessment, is more costly, and is often used for epidemiologic studies.

Although the diagnostic modalities for lactose malabsorption have progressed since the 1970s, the lack of a gold standard has caused variability in clinical practice. Empiric treatment options are available for perceived symptoms consistent with lactose intolerance and consist of avoidance of excessive amounts of dairy, use of lactase-containing tablets and beverages, prebiotics, or probiotics. In children with symptoms suggestive of malabsorption or symptoms impacting growth or the quality of life, we recommend further testing to confirm the diagnosis and consider other etiologies. We suggest the use of hydrogen breath tests as first line owing to its high sensitivity; all it takes is a breath of fresh air.

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References

1. Misselwitz B, Butter M, Verbeke K, Fox M. Update on lactose malabsorption and intolerance: pathogenesis, diagnosis and clinical management. Gut 2019;68:2080-91.
2. Breath hydrogen test for detecting lactose malabsorption in infants and children. Prevalence of lactose malabsorption in Japanese children and adults. Arch Dis Child 1979;54:436-40.
3. Levitt M. Production and excretion of hydrogen gas in man. N Engl J Med 1969;281:122-7.
4. Methodology and indications of H2-breath testing in gastrointestinal diseases: the Rome Consensus Conference. Aliment Pharmacol Ther 2009;29:1-49.