Breast Milk and the Infant Microbiome

It is poorly understood how the infant microbiome develops over time. The authors of this study recruited mother-infant pairs from California and Florida for five different age groups: 0 to 7 days (defined as initial colonization), 8 to 30 days (full maternal milk usage), 31 to 90 days (before solid food introduction), 91 to 180 days (solid food utilization), and 181 to 365 days (after solid food introduction). Initial infant and mother demographics (pregnancy history, delivery history, medications, feeding history) were obtained, and subsequent follow up visits were set up in which study subjects were screened for medical history, antibiotic use, and feeding characteristics. Breast milk, maternal areolar skin swabs, and infant stool samples were collected, and the V4 region of the 16S ribosomal RNA gene was sequenced to determine bacterial diversity of samples.

A total of 107 mother-infant pairs, 12 infants only, and 2 mothers only were enrolled in which 64.5% of infants were born by vaginal delivery, and 30.6% of mothers received antibiotics at delivery. Bacterial sampling demonstrated distinct bacterial profiles with Proteobacteria predominating in breast milk, Firmicutes predominating in areolar skin, and Proteobacteria and Actinobacteria predominating in stool samples. Infant stool samples showed increased bacterial diversity with increasing age with Actinobacteria (mainly, Bifidobacteriaceae) becoming prevalent while Proteobacteria declined. Multivariate analysis demonstrated that bacterial stool sample diversity was significantly associated with infant age at time of stool collection, age of formula introduction, introduction of solid food, infant delivery method, and daily breastfeeding. Infants that primarily breastfed had more bacteria obtained from breast milk and areolar skin, and bacterial taxa also were markedly different between infants that were nonexclusively breastfed compared to strictly formula fed infants, with breastfeeding infants having more Streptococcus, Veillonella, and Rothia species. Finally, infants who continued to breastfeed while eating solid food maintained stool microbiome diversity with their bacteria demonstrating decreased gene expression for energy metabolism as well as sphingolipid and glycan metabolism.

This study demonstrates that bacteria in breast milk influences the microbiome of the infant intestine, and persistence of some bacteria in the infant stool (such as Rothia) may have a preventative effect on allergic disease. It is interesting to consider what other disease prevention effects are present in infants that breastfeed.


Does a Community Effort Lead to a Decline in Pediatric Obesity?

Childhood obesity is an epidemic in the United States, and little is known about effective large-scale preventative measures to effect change in populations at risk for obesity. The authors of this study evaluated the prevalence rates of children in Cincinnati, Ohio diagnosed with overweight (body mass index (BMI) greater or equal to the 85th percentile and less than the 95th percentile for age and sex); obesity (BMI greater or equal to the 95th percentile for age and sex); class 2 obesity (BMI greater or equal to the 95th percentile); class 3 obesity (BMI greater or equal to the 120% of the 95th percentile or BMI greater or equal to 35); and class 3 obesity (BMI greater or equal to the 140% of the 95th percentile or BMI greater or equal to 40). BMI data was obtained using the electronic medical record (EMR) from the children’s hospital in that city. Prevalence rates for the obesity rates were determined in relation to age, sex, race/ethnicity, and type of insurance coverage. Age was broken down into the categories of 2 to 5 years, 6 to 11 years, and 12-18 years.

EMR extraction consisted of 217,037 data points for pediatric BMI over a 3-year study period. An elevated BMI was present in 35.2% of children in the study (15.6% overweight, 12.1% obese, 4.7% class 2 obesity, 2.7% class 3 obesity). Obesity prevalence was highest in children who were older, had Hispanic ethnicity, and who were on Medicaid. Over the 3-year study period, the prevalence of overweight status significantly increased in girls, ages 2 to 5 years of age, while class 3 obesity significantly decreased in girls, ages 6 to 11 years of age. Additionally, there was a significant increase in overweight status in white females of all ages during the study with a significant decrease in obesity for black

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males and in class 3 obesity for black females during the study period. Multivariate analysis demonstrated that class 3 obesity significantly decreased for the entire study population during the 3 years of data analysis.

This study suggests severe obesity (class 3) may be decreasing in children in the greater Cincinnati area, which appears to be going against other national and international pediatric studies. This study also demonstrates that community initiatives preventing obesity (which the authors state are common in the Cincinnati area) may be making an impact. However, it is unknown if this effect will persist long term, and it is also unknown if all overweight and obese children will eventually have a decrease in BMI because of such community initiatives. Finally, it is unknown what the cost of such measures would entail at a national level.


A Red Airway is Not Reflux!

Children with chronic cough, hoarseness, and other upper airway symptoms often undergo direct laryngoscopy by otolaryngologists. Abnormal laryngeal findings, such as a “red airway”, do not have good correlation with gastroesophageal reflux disease (GERD). Acid suppression medications, such as proton pump inhibitors, often are incorrectly prescribed in children, and the authors of this study attempted to correlate pH / multi-channel intraluminal impedance (pH-MII) results with laryngeal endoscopy findings.

Over a 6-year period, 77 pediatric patients were recruited to undergo direct laryngoscopy and bronchoscopy (DLB), esophagogastroduodenoscopy (EGD) with biopsy, and a pH-MII study in the setting of a chronic cough diagnosis. The mean age of recruited patients was 6.5 ± 3.7 years. Videos of DLB were reviewed blindly by three otolaryngologists and were assigned a validated reflux finding score (RFS) consisting of eight subscores with a total score ranging from 0 to 26 (more significant findings associated with a higher score). All patients underwent quality of life scoring (QoL) using the Pediatric Quality of Life Inventory (PedsQL) and the PedsQL Gastrointestinal Symptoms Module.

Findings on pH-MII demonstrated the mean number of acid, non-acid, and total reflux episodes during a 24-hour study period to be 25 ± 15, 23 ± 23, and 48 ± 27 episodes, respectively. The mean percentage time of esophageal acid exposure associated with a pH less than four was 4.8 ± 5.6 %. A low concordance correlation coefficient was noted between pH-MII findings and mean DLB RFS results. There was no significant correlation between mean RFS scores and QoL scoring. Additionally, mean RFS scores were not different between patients with and without esophagitis determined by EGD with biopsy.

These results suggest that laryngeal findings do not correlate with GERD in children. Specifically, in this study, laryngoscopy findings did not correlate with pH-MII, QoL scoring, and EGD with biopsy; thus, laryngoscopy findings should not be used to diagnose GERD. Hopefully, this study will lead to a reduction in inappropriate diagnoses of GERD in children (especially in children with a chronic cough), which will lead to the downstream effect of reducing inappropriate PPI use.


Esophageal Dilation in Children with Eosinophilic Esophagitis

Eosinophilic esophagitis (EoE) is chronic allergen-mediated disease associated with esophageal inflammation, which can progress to esophageal fibrosis and stricture formation. Early clinical experience with EoE suggested that such patients were a high risk group for esophageal perforation. However, more recent studies evaluating the efficacy of dilation for adult patients with EoE have shown this intervention to be safe. There has been no pediatric research in this area, and the authors of this study performed a five-year retrospective review of all pediatric patients who had undergone esophageal dilation for EoE at a large tertiary United States children’s hospital with expertise in EoE diagnosis and treatment.

An electronic medical record was used to determine the number of children ages 18 years or younger who...
had been diagnosed with EoE and who had subsequently undergone dilation for esophageal stricture formation over a 5-year period. Symptom response to esophageal dilation was recorded within 2 months after dilation. Adverse events were graded on a severity scale of 1 to 5, ranging from grade 1, which included telephone management and supportive care to grade 5, which included death. The study determined that 7092 upper endoscopies with 451 associated dilations occurred during the study period. Additionally, 1378 upper endoscopies without dilation occurred in 781 patients with EoE and 68 dilations occurred in 40 patients with EoE. Both balloon dilators and bougie dilators were used in patients with stricturing disease with 72% of dilations occurring using the bougie technique.

Half of the 40 patients with EoE requiring dilation had already undergone medical therapy for EoE. A total of 23 of these patients (58%) required only one dilation although the remainder of patients required up to 5 dilations. Symptom improvement after 2 months was present in 86% of patients. The adverse event rate for grade 2 or greater complications occurred in 1.35% of all the patients. Complications occurred in 0.7% for patients with EoE, 3.1% of non-EoE patients who had undergone dilation, and 2.9% of EoE patients who had undergone dilation. Although significantly more complications occurred in patients undergoing esophageal dilation compared to patients not undergoing dilation, there was no significant difference in the complication rate of dilation between patients with and without EoE. The most significant complication was scored as grade 3 (defined as hospitalization and/or intervention such as blood transfusion or repeat endoscopy) which occurred only in one patient with EoE who had undergone dilation and was observed overnight for post-dilation pain with no perforation noted.

This study suggests that dilation is a safe procedure that can be performed in children with esophageal strictures associated with EoE. These results match data in adult dilation studies and should provide pediatric gastroenterologists with useful information about the safety of this therapeutic intervention in children with EoE.


John Pohl, M.D., Book Editor, is on the Editorial Board of Practical Gastroenterology

Answers to this month’s crossword puzzle:

15. JAR

12. DIG 13. CAND 14. IDA 15. NCI
16. INR 17. SAC 18. PDS


20. PATIENTS 21. GOWERS


31. DE 32. U 33. MAR

34. AVASCULAR 35. CAJAL 36. SO

37. EAT 38. PERIGASTRIC