Background

- The gastrointestinal (GI) tract of a normal fetus is sterile.
- The type of delivery has an effect on the development of the intestinal microbiota.
  - Vaginally born infants are colonized with their mother’s bacteria.
  - Cesarean born infants’ initial exposure is more likely to environmental microbes from the air, other infants, and the nursing staff which serve as vectors for transfer.
  - The primary gut flora in infants born by cesarean delivery may be disturbed for up to 6 months after birth (Gronlund et al, 1999.)
- Babies at highest risk of colonization by undesirable microbes or when transfer from maternal sources cannot occur are cesarean-delivered babies, preterm infants, full term infants requiring intensive care, or infants separated from their mother.
  - Infants requiring intensive care acquire intestinal organisms slowly and the establishment of bifidobacterial flora is retarded.
  - A delayed bacterial colonization of the gut with a limited number of bacterial species tends to be virulent.
  - Control and manipulation of the neonatal gut with human milk can be used as a strategy to prevent and treat intestinal diseases (Dai & Walker, 1999.)
- Major ecological disturbances are observed in newborn infants treated with antimicrobial agents.
  - One way of minimizing ecological disturbances in the NICU is to provide these babies with fresh breast milk (Zetterstrom et al, 1994.)
- Breastfed and formula-fed infants have different gut flora.
  - Breastfed babies have a lower gut pH (acidic environment) of approximately 5.1-5.4 throughout the first six weeks that is dominated by bifidobacteria with reduced pathogenic (disease-causing) microbes such as E. coli, bacteroides, clostridia, and streptococci.
  - Flora with a diet-dependent pattern is present from the 4th day of life with breast milk-fed guts showing a 47% bifidobacterium and formula-fed guts showing 15% Enterococci prevail in formula-fed infants (Rubalitelli et al, 1998.)
  - Babies fed formula have a high gut pH of approximately 5.9-7.3 with a variety of putrefactive bacterial species.
  - In infants fed breast milk and formula supplements the mean pH is approximately 5.7-6.0 during the first four weeks, falling to 5.45 by the sixth week.
  - When formula supplements are given to breastfed babies during the first seven days of life, the production of a strongly acidic environment is delayed and its full potential may never be reached.
- The neonatal GI tract undergoes rapid growth and maturational change following birth.
  - Infants have a functionally immature and immunonaive gut at birth.
  - Intestinal permeability decreases faster in breastfed babies than in formula-fed infants (Catassi, et al, 1995.)
  - Open junctions and immaturity play a role in the acquisition of NEC, diarrheal disease, and allergy.
  - slgA from colostrum and breast milk coats the gut, passively providing immunity during the time of reduced neonatal gut immune function.
  - Mothers’ slgA is antigen specific. The antibodies are targeted against pathogens in the baby’s immediate surroundings.
  - The mother synthesizes antibodies when she ingests, inhales, or otherwise comes in contact with a disease-causing microbe.
Clinical Perspectives In Lactation

Janice M. Riordan Distinguished Professorship in Maternal Child Health

Nancy G Powers, M.D., has been selected to fill the Janice M. Riordan Distinguished Professorship in Maternal Child Health at Wichita State University (WSU). The professorship, with its emphasis on breastfeeding and human lactation, is the first such position at WSU and perhaps anywhere in the United States. This position, in honor of WSU professor Jan Riordan, was funded with an anonymous $1.6 million gift. Dr. Powers has been board certified in pediatrics since 1984. She has worked with Wellstart International, Mercy Hospital and Medical Center in San Diego, CA, the University of Kansas School of Medicine-Wichita, Pediatric Medical Group of Kansas at Wesley Medical Center, and her own private practice, Breastfeeding Medicine of Kansas. Kansas breastfeeding supporters are honored to have the Janice M. Riordan Distinguished Professorship at WSU.

Business Case for Breastfeeding Grant

The Kansas Breastfeeding Coalition (KBC) and its partners the Mother Child Health Coalition and Healthy Babies Program/Northeast Wichita Healthy Start Initiative, Sedgwick County Health Department have been awarded a Business Case for Breastfeeding Train-the-Trainer grant. The grant was awarded through the U.S. Department of Health and Human Services, Health Resources and Services Administration to provide training on working with employers to promote and support breastfeeding. Fifty-five percent of mothers with children under age three are employed outside the home. Breastfeeding saves employers with reduced health care costs, employee absenteeism, and employee turnover. If interested in learning more about how you can help employers support breastfeeding families or to receive an invitation to this workshop, contact Martha Hagen, MS, RD, LD, IBCLC, Kansas Breastfeeding Coordinator, mhagen@kdheks.gov

Free CEU’s

Free online resource for training health professionals, MD’s, RN’s, etc on breastfeeding, that provides seven credits of CME from the University of Virginia. Find information at www.breastfeedingtraining.org. The Breastfeeding Training Course will provide health professionals with detailed information regarding the theory and practice of lactation management. The university hopes to encourage health care professionals in all health care specialties to become teachers and supports of breastfeeding and lactation management.

Breastfed Baby May Mean Better Behaved Child

A study about breastfeeding and fewer behavioral problems in young children was presented last fall at the American Public Health Association’s annual meeting. The study reviewed 100,000 interviews of parents and guardians of children between the ages of 10 months and 18 years who participated in the National Survey of Children’s Health. Breastfed children were less likely to have a medically diagnosed behavioral or conduct problem and parents of breastfed children were 15 percent less likely to be concerned about their child’s behavior. The longer a child was breastfed the greater the benefit. A child who had been breastfed for a year was less likely to have behavior problems than a child who had been breastfed for two months. Does the nutritional composition of breastmilk have an effect on the way the baby’s brain develops? More study is needed to determine the exact cause of the potentially protective effect.

Australian Study Shows Less Abuse for Breastfed Children

In a study of 6,621 Australian children over 15 years, researchers found that those who were breast-fed were far less likely to be neglected or abused by their mothers. Babies who were not breastfed were more than 2.5 times as likely to be maltreated by their mothers as those who were nursed for four months or more, the study shows. There was no link between breastfeeding and the risk of maltreatment by fathers or others. One American psychologist proposes that the study has it backwards. “... researchers may have it backward. Instead of breastfeeding turning women into good mothers, it’s possible that good mothers are more likely to breastfeed.”
Supplementation of the Breastfed Baby “Just One Bottle …” continued

◊ These antibodies ignore useful bacteria normally found in the gut and ward off disease without causing inflammation.

◊ Infant formula should not be given to a breastfed baby before gut closure occurs.

◊ Once dietary supplementation begins, the bacterial profile of breastfed infants resembles that of formula-fed infants in which bifidobacteria are no longer dominant and the development of obligate anaerobic bacterial populations occurs (Mackie, Sghir, Gaskins, 1999).

◊ Relatively small amounts of formula supplementation of breastfed infants (one supplement per 24 hours) will result in shifts from a breastfed to a formula-fed gut flora pattern (Bullen, Tearle, Stewart, 1977.)

◊ The introduction of solid food to the breastfed infant causes a major perturbation in the gut ecosystem, with a rapid rise in the number of enterobacteria and enterococci, followed by a progressive colonization by bacteroides, clostridia, and anaerobic streptococci (Stark & Lee, 1982).

◊ With the introduction of supplementary formula, the gut flora in a breastfed baby becomes almost indistinguishable from normal adult flora within 24 hours (Gerstley, Howell, Nagel, 1932.)

◊ If breast milk were again given exclusively, it would take 2-4 weeks for the intestinal environment to return again to a state favoring the gram-positive flora (Brown & Bosworth, 1922; Gerstley, Howell, Nagel, 1932.)

◊ Infants at high risk of developing atopic disease has been calculated at 37% if one parent has atopic disease, 62-85% if both parents are affected and dependant on whether the parents have similar or dissimilar clinical disease, and those infants showing elevated levels of IgE in cord blood irrespective of family history (Chandra, 2000.)

◊ Cross reactivity exists between cow’s milk protein and human milk protein (Bernard et al, 2000). Only 1 nanogram of bovine b-lactoalbumin is required to sensitize a susceptible infant (Businco et al, 1999.)

◊ In breastfed infants at risk, hypoallergenic formulas can be used to supplement breastfeeding; solid foods should not be introduced until 6 months of age, dairy products delayed until 1 year of age, and the mother should consider eliminating peanuts, tree nuts, cow’s milk, eggs, and fish from her diet (Zieger, 1999; AAP, 2000.)

◊ Stored frozen breast milk is the optimal choice for supplementing a breastfed baby, especially in the presence of high atopic risk; in the absence of stored breast milk, an extensively (not partially) protein hydrolyzed formula is recommended (Zieger, 2003.)

◊ Study results on asthma and atopy can be confounded by the early introduction of infant formula, as small amounts of early formula may be damaging to the development of an infant’s immune system; this should be considered in research analysis, even if a mother goes on to predominantly breastfeed (Oddly et al, 2003)

◊ Infants who are exclusively breastfed for at least 4 months have a lower risk of seroconversion leading to beta-cell autoimmunity (Vaarala et al, 1998.)

◊ The lack of human insulin in infant formulas may break the tolerance to insulin and lead to the development of Type 1 diabetes (Vaara et al, 1998.)

◊ The absence of cow’s milk protein for the first several months of life may reduce the later development of IDDM or delay its onset in susceptible individuals (AAP, 1994.)

◊ Infants who are exclusively breastfed for at least 4 months have a lower risk of seroconversion leading to beta-cell autoimmunity.

◊ Short-term breastfeeding and the early introduction of cow’s milk based infant formula predispose young children who are genetically susceptible to Type 1 diabetes to progressive signs of beta-cell autoimmunity (Kimpimaki et al, 2001.)

◊ Sensitization and development of immune memory to cow’s milk protein is the initial step in the etiology of IDDM (Kostraba, et al, 1993.)

◊ Sensitization can occur with very early exposure to cow’s milk before gut cellular tight junction closure.

◊ Sensitization can occur with exposure to cow’s milk during an infection-caused gastrointestinal alteration when the mucosal barrier is compromised allowing antigens to cross and initiate immune reactions.

◊ Sensitization can occur if the presence of cow’s milk protein in the gut damages the mucosal barrier, inflames the gut, destroys binding components of cellular junctions, or other early insult with cow’s milk protein leads to sensitization (Savilahti, et al, 1993.)

◊ Beta cell autoimmunity is increased in children who are not breastfed or breastfed for a short time. Early introduction of cow’s milk based formula increases the risk for developing type 1 diabetes up to 5 years of age in the general population (Holmberg et al, 2007.)

The Nutritional Committees from the American Academy of Pediatrics and jointly the European Society for Pediatric Allergology and Clinical Immunology and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition recommend exclusive breastfeeding as the hallmark for food allergy prevention (Zeiger, 2003; Muraro, et al, 2004.)

References

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“Just One Bottle” References continued


Kimpimaki T, et al. Short-term exclusive breastfeeding predisposes young children with increased genetic risk of Type 1 diabetes to progressive beta-cell autoimmunity. Diabetologia 2001; 44:63-69


