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Early Introduction of Cereal and Risk of Type 1 Diabetes

Type 1 diabetes develops when the body begins to destroy its insulin-producing cells in the pancreas. While genes are very likely to predispose individuals to type 1 diabetes, exposure to “environmental triggers” at critical periods during development may be important. Previous studies have yielded conflicting results regarding the effects of early exposure to cow’s milk, breastfeeding, and the timing of first solids on the development of diabetes. Two recent observational studies have shed some light on how infant diet may influence development of type 1 diabetes.

In the two studies, information was collected over time from a large group of infants who were born to parents with type 1 diabetes. The BABYDIAB study collected data on feeding practices and blood samples in 1610 children in Germany from birth through 8 years of age. The DAISY study, conducted in the Denver area, followed 1183 children from birth up to 9 years of age and also included some children without a family history of diabetes. In both studies, the main outcome was appearance of autoantibodies to insulin and other pancreatic islet antigens. Appearance of these autoantibodies is an early marker for the process that destroys the pancreatic cells. In these studies, 25 to 50% of the children testing positive for the autoantibodies developed type 1 diabetes later on during the follow-up period.

Early introduction of cereal increased the risk of developing autoantibodies. In the DAISY study, both early (before 4 months of age) and late (after 7 months of age) introduction of cereal increased the risk of developing autoantibodies. The DAISY study also found that early introduction of cereal increased risk of developing autoantibodies, regardless of a family history of type 1 diabetes. Rice-based and gluten-containing cereals contributed similarly to risk. Neither study found that early introduction to cow’s milk formula increased risk. Likewise, longer duration of exclusive breastfeeding did not reduce risk. However, breastfeeding may still be indirectly related to risk, since longer duration of exclusive

breastfeeding was associated with a delay in introducing gluten-containing cereals.

We still do not know exactly how the timing of giving cereal is related to the appearance of autoantibodies. One possibility is that the cereal antigens have an inflammatory effect on the immature gut of the young infants. This inflammatory effect may evoke an immune response. When parents wait until after 7 months to give cereal, they may simply feed too much at the initial exposure. Another possibility is that cereal may increase the carbohydrate load, stimulating the pancreas to produce more insulin. Higher insulin levels may increase autoantibody production.

Conclusions and Implications: The main message for health practitioners is that parents should be encouraged to follow current guidelines and avoid introducing cereal to infants before four months of age. The advice is especially important for infants with a family history of type 1 diabetes.

Sources:

Norris JM, Barriga K, Klingensmith G, Hoffman M, Eisenbarth GS, Erlich HA, Rewers M. Timing of initial cereal exposure in infancy and risk of islet autoimmunity. *JAMA* 2003; 290; 1713-1720.

Ziegler AG, Schmid S, Huber D, Hummel M, Bonifacio E, Early infant feeding and risk of developing type 1 associated antibodies. *JAMA* 2003: 290; 1721-1728.

Does Breastfeeding Help Mothers Lose Weight?

Postpartum weight changes in breastfeeding women can be highly variable, ranging from an average loss of 14% to a gain of 10%. Using data from the Nurses' Health Study II, the authors of this study have re-visited the question of whether breastfeeding helps women lose weight after pregnancy.

The Nurses' Health Study is a longitudinal study of 116,671 women who have completed mailed questionnaires every two years since 1989. The subsample (n=4348) used in this analysis was a group of healthy women who were 24-40 years in 1989 and gave birth to one child in 1990 or 1991. Smokers were excluded from the analysis. In the 1997 follow-up, women recalled data on breastfeeding practices during the 1990-91 pregnancy. The main outcome was weight change between 1989- 93, presumably based on self-reported weight.

From 1989 to 1993, the average weight gain, including postpartum weight retention, ranged from 2.1 to 8.4 kg. Women who were initially overweight (BMI > 25) in 1989 tended to gain the most weight. After controlling for differences in initial BMI, physical activity, and age, women who breastfed gained about 1 kg more from 1989 to 1993 than women who did not breastfeed. This difference was significant only for normal or underweight women having their first baby (p< 0.02) and overweight women having a second baby (p<0.04).

Conclusions and Implications: Based on this study, breastfeeding appears to have little impact on weight gain of women over time, but there are some limitations worth mentioning. Determination of breastfeeding practices relied on the mother's ability to recall details more than 5 years later. Self-reported weight, particularly among overweight women, also tends to be inaccurate. Thus, failure to find an impact of breastfeeding on maternal weight change is not necessarily surprising.

Source: Sichieri R, Field AE, Rich-Edwards, Willett WC. Prospective assessment of exclusive

breastfeeding in relation to weight change in women. *Int. Journal of Obesity* 2003; 27: 815-820.

Identifying Mothers and Babies at Risk for Breastfeeding Problems

Given limited resources, health providers have to be able to identify mothers and babies that may need extra breastfeeding support and advice soon after delivery. The first week after delivery is a critical time to help new mothers, because many women stop breastfeeding as soon as problems arise. Early signs of breastfeeding problems include poor infant breastfeeding behavior (inadequate arousal, rooting, and latching on), delayed onset of milk production, and excess infant weight loss. The aim of this study was to determine the incidence of these breastfeeding problems and the associated risk factors in a population highly motivated to breastfeed exclusively.

In choosing a highly motivated population, the researchers were able to focus primarily on the biomedical factors affecting early breastfeeding outcomes. Upon recruitment within 24 hours of delivery, the women reported intentions of breastfeeding an average of 11 months and strong family support for breastfeeding. A total of 280 were recruited for the study. Lactation consultants provided guidance to each woman in the hospital and made home visits on days 3, 7, and 14 to collect data and provide additional advice. Data on labor and delivery were taken from each woman's medical record. During breastfeeding observations, the lactation consultants recorded nipple type (inverted, flat, or normal) and used the Infant Breastfeeding Assessment Tool (IBFAT) to rate the infant's feeding behavior. The lactation consultants weighed and measured the mothers and infants and collected other breastfeeding data by interview. The main breastfeeding outcomes included suboptimal infant breastfeeding behavior, delayed onset of lactation (> 72 hours postpartum), and excess infant weight loss (> 10%).

As might be expected, these three outcomes were interrelated. For instance, excess infant weight loss was seven times more likely when onset of milk production was delayed more than 72 hours. Suboptimal infant feeding behavior in the first 24 hours increased the likelihood of delayed milk production more than two-fold. However, somewhat more surprising is how common these breastfeeding problems were in this highly motivated, well-educated population:

- 49% of babies nursed inadequately during the first 24 hours after birth, 14% continuing to nurse inadequately at one week;
- 22% of mothers experienced delayed onset of milk production; and
- 12% of the babies lost more than 10% of their birth weight.

Based on the results of this study, the authors recommend follow-up for all breastfeeding mothers and babies between 72 to 96 hours postpartum. High-risk groups requiring special attention include all primiparas (especially those delivering large babies), multiparas who receive labor medications, mothers who deliver by cesarean section or have a long labor, women with flat or inverted nipples, overweight mothers, and infants who nurse inadequately in the first 48 hours. The authors also recommend avoiding nonbreast milk fluids and pacifiers in the first week of life. Clinical management that increases the likelihood of delivering vaginally without medications and a prolonged labor should improve breastfeeding.

Conclusions and implications: Breastfeeding problems during the first week of life may be

common, even in well-educated, highly motivated populations. However, with appropriate guidance, support and management, many nursing mothers may be able to avoid or overcome difficulties encountered during the first week after delivery.

Source: Dewey KG, Nommsen-Rivers LA, Heinig MJ, Cohen RJ. Risk factors for suboptimal infant breastfeeding behavior, delayed onset of lactation, and excess neonatal weight loss. *Pediatrics* 2003; 112: 607-619.

Effects of High-Protein, Low-Carbohydrate Diets during Pregnancy

With the Atkins and other high-protein diets getting widespread attention these days, the potential harmful effects of unbalanced high-protein, low-carbohydrate diets during pregnancy are important to consider. Although not specifically looking at the Atkins and other current fad diets, a long-term follow-up study from the United Kingdom reported that maternal diets high in meat/fish and low in green vegetables are associated many years later with higher plasma cortisol and systolic blood pressure in the offspring.

Apparently, women who delivered in a Scottish hospital between 1967-68 were routinely advised to eat a pound of red meat daily and avoid potatoes, bread, and other starchy foods to prevent preeclampsia. As a result, average protein and energy intakes of these mothers was 88 g and 1443 kcal, compared to 71 g and 2089 kcal of other pregnant Scottish women. Prenatal weight gain and birthweight were lower among mothers following the high-protein advice, compared to women with more balanced diets. When the babies (now adults) were located 30 years later, the researchers collected a battery of data, including body mass index (BMI), blood pressure, lifestyle factors (smoking, alcohol intake, physical activity), and blood samples. Controlling for gender, BMI, and current alcohol intake, high-intake of meat/fish in the second half of pregnancy was associated with an increase in systolic blood pressure ($p=0.02$). After adjusting for maternal blood pressure and smoking during pregnancy, high meat/fish consumption on remained significantly related to the offspring's blood pressure ($p=0.01$). Since high-protein meals can raise cortisol levels in humans, the researchers suggested that fetuses could have been "programmed prenatally" to produce more cortisol later in life. High plasma cortisol, especially in obese adults, could raise blood pressure. The researchers did find evidence that offspring of mothers with high meat/fish diets have increased plasma cortisol levels ($p=0.03$).

Conclusions and Implications Although the dietary measures in this study were fairly crude, the study might have yielded more useful information, if the paper had included more data of the combined effects (or interactions) of different food patterns on outcomes. Nevertheless, one still may conclude that, for a variety of reasons, pregnant women should avoid very unbalanced diets.

Source:

Shiell AW, Campbell-Brown, Haselden S, Robinson S, Godfrey KM, Barker DJP. High-meat, low-carbohydrate diet in pregnancy relation to adult blood pressure in the offspring. *Hypertension* 2001; 38: 1282-1288

Herrick K, Phillips DIW, Haselden S, Shiell AW, Campbell-Brown-M, Godfrey KM. Maternal consumption of a high-meat, low-carbohydrate diet in late pregnancy: relation to adult cortisol concentrations in the offspring. *J Clin Endocrinol Metab* 2003; 88: 3554-3560.

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