Maternal & Infant Nutrition Briefs

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## AAP Statement on Iron-fortified Formula

In the July issue of *Pediatrics*, the American Academy of Pediatrics (AAP) updated their position on the use of iron-fortified formulas. Their statement identified some important gaps in knowledge, particularly related to needs in partially breastfed infants. This article briefly reviews their conclusions and recommendations.

Iron requirements in infancy

Most babies born at term have about 75 mg of iron per kg body weight, mostly in hemoglobin. Babies of mothers with poorly controlled diabetes and low birth weight babies may have lower iron stores (10-40% of normal levels). During the first 4 months after birth, fetal blood cells are broken down, and the iron is re-used, along with iron from breast milk or formula. Most babies need about 1 mg of iron/kg body weight/day to support normal growth and development, but premature babies may need as much as 2-4 mg/kg/day due to lower iron stores at birth. Others needing additional iron are those born to poorly controlled diabetic mothers and small-for gestational age babies. Absorption of iron is greatly affected by the infant's iron stores, the source of iron (i.e., breast milk or formula), and the form of iron.

Why iron-fortified formulas are needed

Before the 1970's, iron-fortified formula was not routinely used in the U.S., and rates of iron deficiency anemia were very high in infancy, about 20%. Since iron-fortification, these rates have dropped to less than 3%. Yet, 9-30% of mothers not receiving formula from the Women, Infants and Children (WIC) Program choose low-iron formula for their babies. The early stages of iron deficiency may be missed in many infants, because the tests needed to detect this condition are not routinely done. Iron deficiency and, in its severe form, anemia, are associated with weakness, fatigue, and abnormal gastrointestinal function, and can interfere with learning.

How much iron should be provided

In the U.S., iron levels in iron-fortified formula range from 10-12 mg per liter. In European countries, the level provided is less, between 4-7 mg/liter. The AAP statement included no further discussion of this difference but does cite evidence that iron status is similar among infants fed 8 and 12 mg per liter of iron. The AAP statement discusses the potentially adverse effects of the higher levels of iron (i.e., 12 mg/L) on the intestinal flora of partially breast-fed babies. In particular, higher levels of iron may interfere with the ability of lactoferrin to protect the partially breastfed baby from overgrowth of *Escherichia coli* in the intestine. No mention was made of potential effects of the higher levels of iron on zinc and copper status. AAP calls for more studies on the long-term consequences of moderate levels of iron (4-7 mg/L) and the optimal levels of iron in formula for partially breastfed infants to prevent infection and maintain normal iron status. Based on their calculations, AAP concludes that up to 12 mg/L may be needed to meet iron needs.

Recommendations

Given these observations and others in their statement, the AAP makes the following recommendations:

- Human milk is preferred for all infants, except in rare medical conditions.
- Infants fed formula should receive an iron-fortified formula (4-12 mg/L) from birth to 12 months.
- Formulas with less than 4 mg/L should not be manufactured or at least display a warning that such formula is nutritionally inadequate. These formulas should not be used to treat colic, constipation, cramps, or gastrointestinal reflux.
- If low-iron formula continues to be available and bears the label of "nutritionally inadequate", iron-fortified formulas should have the term "with iron" removed from their labels to avoid confusing the public.
- Parents and providers should be educated about the role of iron in growth and development and lack of evidence linking iron-fortification to gastrointestinal distress.

**Source:** American Academy of Pediatrics, Committee on Nutrition. 1999. Iron Fortification of Infant Formula. Pediatrics 104 (1):119-123.

## Energy Needs in Pregnancy

Does a single recommendation for energy work for all pregnant women? Current recommendations call for an increase of 250-300 calories during most of the pregnancy for normal growth. However, some studies have shown that actual energy intakes may increase very little during pregnancy, yet weight gain remains normal. Women appear to have the capacity to rely on different strategies, such as decreasing metabolic rate or activity or mobilizing fat stores, as well as increasing energy intakes, to support fetal growth. This capacity to use different strategies may be adaptive where food supplies are limited or physical labor demands are high. The purpose of this study was to examine to what extent well-nourished women use different strategies to meet their energy needs. The researchers also wanted to determine if any characteristics of the women before pregnancy could predict which strategies they use.

In this carefully designed study, the researchers measured energy expenditure, energy intake, weight gain, and body composition in ten well-nourished women before, during, and after their pregnancies. All women had normal pre-pregnant weight (body mass index ranged from 19.5 to 26 $kg/m^2$) and were expecting their second or third babies. The women followed their usual diet but came to the metabolic unit on five occasions when measurements were

taken.

The degree of variability in how these women met their energy needs was astonishing. For example, although the women increased their energy intakes during pregnancy by an average of 9% (185 calories), one woman increased her intake by 520 calories, while two others decreased energy intakes. Changes in fat stores also varied widely from a loss of 0.6 kg to a gain of 10.6 kg during pregnancy. Energy expended in activity also varied from a decrease of 550 to an increase of 700 calories per day. Interestingly, most characteristics of the women before pregnancy, such as usual energy intakes, body mass index, and body fat, did not predict which strategies the women would use to meet their energy needs when pregnant. However, women with the highest resting metabolic rates (RMR) before pregnancy deposited more fat during pregnancy. This finding relating RMR before pregnancy to fat gain during pregnancy has not been reported before and needs to be confirmed by others.

Nutritionists and health providers who counsel pregnant women are probably not greatly surprised by the variability seen in this study. These findings will make it harder to justify using one energy recommendation for all women or even all well-nourished with normal pre-pregnant body weights. As one reviewer commented, a prudent course might be to avoid "one-size-fits-all" recommendations for energy intake but rather to monitor weight gain and suggest adjustments when the pattern of weight gain is not normal.

**Sources :** Kopp-Hoolihan, LE, van Loan MD, Wong WW, King JC. 1999. Longitudinal assessment of energy balance in well-nourished pregnant women. AJCN 69: 697-704. Pitkin, RM. 1999. Energy in pregnancy. AJCN 69: 583.

**The Lure of Forbidden Foods**

Many well-meaning parents attempt to restrict their children's intake of certain tempting foods, particularly sweets and dessert items. Is such a practice counter-productive? In other words, does restriction actually increase the child's demand, selection, and intake of those foods?

Recently, Fisher and Birch examined this question in two separate experiments involving 3-6 year old children attending a day care program at Pennsylvania State University.

In the first experiment, 31 preschoolers, sitting at tables with 3-4 children each, were offered two types of fruit bar cookies at snack time during a 5 week period. Initially, the children had no preference for one type of cookie over the other. The children were given free access during the 20 minute snack session to one type and only 2 minutes of access to the other type which was kept in a glass jar on the table. The researchers found that over time the children--and especially the boys--made more requests for and attempts to reach the restricted cookies. However, compared to baseline, the children did not select the restricted snack more often nor eat more of it when given equal access to both cookies three weeks after the experiment was over.

In the second experiment, 40 preschoolers, also sharing tables with 3-4 children, were observed during 4 unrestricted and 4 restricted snack sessions. The concept was similar to that of the first experiment: children were allowed unrestricted access to a "neutral" (neither liked or disliked) wheat cracker and only 5 minutes of access to a highly preferred food, either fish-shaped cheese or pretzel crackers. The researchers observed that interest in, and selection and intake of the preferred food increased during the restricted compared to

unrestricted sessions.

The researchers conclude that restricting a child's access to palatable foods is not an effective way to moderate intake of those foods. However, several important questions remain. First, no evidence was given that the children actually increased their preferences for the restricted foods and would seek out those foods in a different setting. Second, the children were clearly able to see and taste the restricted foods in these experiments. If the children were to ask for a food that the parents refused to bring into the home, would that type of restriction increase child demand for and eventually intake of the food? Clearly, more research is needed to guide parents in helping their children moderate intake of foods from the tip of the Food Pyramid.

**Source:** Fisher, J. O. and Birch L. L. 1999. Restricting access to palatable foods affects children's behavioral response, food selection, and intake. AJCN. 69:1264-72.

## Counseling Tips for Pregnant and Breast-feeding Teens

Between 1991 and 1997, the teen pregnancy rate dropped 16% but 95% still opt to keep their babies. A recent article in the *Journal of the Dietetics Association* summarizes some tips for working with teens, based on observations of Mary Story, PhD RD and lactation consultants, Mary Zentis and Janet Washington. These tips include the following:

- Explain carefully the components of weight gain during pregnancy. If they are gaining in a normal range (20-30 lbs), avoid dwelling on the issue of weight gain. About 30% gain excessive, and 20% gain inadequate amounts of weight prenatally. For the latter, be sure to screen for food availability problems.
- Teach teens to make healthful food choices in a variety of settings, including fast food restaurants and at breakfast, snacks, and quick-fix dinners.
- Use teen mentors to teach breast-feeding skills. Teens accept advice more readily from peers than adults.
- Pay attention to particular breast-feeding concerns, especially breast-feeding in public.
- Reassure teens that their bodies are capable of producing milk unique to the baby's needs and that even a little breast-feeding is better than none at all. Avoid being judgmental.
- Target teens for extra support in the hospital because many are undecided about breast-feeding right up to the day of delivery.

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