How To Feed Babies and Toddlers in the 21st Century

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Feeding young children a healthy diet is a challenge. U.S. national nutritional surveys show that more than half of children under 3 years fail to get recommended intakes of the essential nutrients, and the problem is not just confined to poor families (Centers for Disease Control, 1994; Kennedy & Goldberg, 1995). In some ways, today's children are worse off nutritionally than those raised a generation ago. They eat more foods containing few vitamins and minerals, and, in particular, soda has replaced milk as the national beverage (Liebman, 1998). Problems are even seen in families that make nutrition a priority. For example, parents who never serve eggs and red meat (to limit cholesterol) are keeping children away from the most concentrated sources of vitamins and minerals that could help bridge the nutrient gap. Growth failure has even been reported in some children of very health-conscious families whose extremely low-fat, whole-food diet was right for the parents but contained insufficient calories to allow for normal childhood weight gain.

Another concern is that many of today's young children are extremely sedentary. Average energy requirements are now 15 to 20 percent lower than government recommendations (Prentice et al. 1988), and this makes it hard even for children who generally eat well to consume enough vitamins and minerals, because total food intake is so small. Low energy requirements also make overeating and obesity more likely. Sedentary children whose appetites exceed their energy needs may suffer the double tragedy of being simultaneously overfed and undernourished.

The question of whether the poor nutritional intake of today's children really matters is an important one. Exactly how important *is* good nutrition in early childhood? New information accumulating from research studies from around the world offers strong evidence that the foods consumed early in life have long-lasting—and in some cases permanent—effects (Ciba Foundation, 1991; Lucas, 1994; Roberts & McDonald, 1998; See also Meyers & Chawla, this issue). School performance, adult intelligence, bone strength, height, and risk of obesity are just a few of the things measurably influenced by early childhood feeding (Knittle & Hirsch, 1968; Walravens et al., 1983; Lewis et al. 1986; Ciba Foundation, 1991; Lozoff et al., 1991; Johnston et al. 1992; Lucas et al., 1992; Lucas, 1994; Epstein et al. 1995, Kretchmer et al. 1996; Kikafunda et al., 1998; Roberts & McDonald, 1998; Roncagliolo et al. 1998; Anderson et al. 1999). On these grounds alone early childhood feeding is clearly important, and needs to be more of a priority than we have allowed it to become recently.

How do foods consumed early in life exert effects beyond the short time they are physically present in a child's body? Scientists don't yet have all the answers, but currently believe that the long-term effects of early food (called *metabolic programming* in research circles) happen in large part because growth and cell division occur only in childhood. During this time, individual cells are sensitive to the availability of nutrients. The nutrients physically present at the crucial times when cell division and growth occur help determine which cell types become predominant within each tissue; influence how large or small each cell within the different body components ultimately becomes; and influence how efficiently and well each cell functions in the future. And because organ and tissue functions determine such essential body processes as hormone production and enzyme activity, alterations in normal development can have far-reaching effects.

Goals for healthy eating

Knowing what foods make up good nutrition for a child is the first step in promoting healthy eating. Table 1 shows portion sizes designed to meet current Dietary Reference Intakes (DRIs, the updated version of government Recommended Dietary Allowances, or RDAs) for different ages up to 3 years. The USDA Food Guide Pyramid for children 2-6 years can also be used to

Drs Roberts and Heyman are also authors of *Feeding Your Child for Lifelong Health* (Bantam, 1999).

ensure DRIs, but some portions are too large to be feasible for many young children (for example, daily vegetable portions are 2 cups of leafy vegetables or 1 whole cup solid vegetables). Moreover, these portions actually provide intakes in excess of many DRI's/RDAs, and may thus best serve as a general guideline rather than a specific road map for serving recommendations.

The question of whether vitamins and minerals are necessary is often raised. Technically, young children can meet DRIs/RDAs with food alone. However, with all the accumulating research showing that even subtle nutrient deficiencies can have long-term harmful effects, the basic variety of multivitamin/mineral supplements for children with roughly 100 percent of the USRDAs for most vitamins and minerals are a safe and easy way to ensure that every child gets the best possible start in life. Supplements are particularly valuable for those children suspected to have extremely inadequate diets, due either to picky eating habits or to very low energy requirements.

Table 1:

Food portions for meeting RDAs/DRIs at different ages

Birth to 6 months

• Breast milk or formula

• Weaning foods with a low allergy potential, such as baby rice cereal and apple puree, can be introduced between 4 and 6 months when baby starts to indicate readiness

6-12 months

• Breast milk or formula (formula intakes decreasing gradually in tandem with increasing solid foods from about 28-39 oz per day at 6 months to 20-30 oz per day at 12 months)

• Safe weaning foods (for example, fruit and vegetable purees at 6 months, plain cereals, meat and egg yolks at 8 months, small pieces and strips of these foods from 9 months)

• Some water for thirst

1-2 years

• 16-24 oz whole cow's milk

• 1/2-1 cup fresh fruits/vegetables

• 1-2 1oz servings lean meat, poultry, egg or fish

• About 200-500 calories' worth of other good foods such as fortified cereal, breads, legumes as appetite demands

• Water for thirst

2-3 years

• 16-24 oz low fat or skim cow's milk

• 3/4-1 1/4 cup fresh fruits/vegetables

• 1-3 1oz servings lean meat, poultry, egg or fish

• About 400-800 calories' worth of other good foods such as fortified cereal, breads, legumes as appetite demands

• Water for thirst

Dian Jacobson

Getting healthy foods eaten—and enjoyed

Getting healthy food on the table is important—but *how* children are fed also matters. Many adults have been told that all they have to do is provide healthy food at each meal, and children will eat that food if nothing else is available. Unfortunately, this simply isn't true and doesn't work as a single strategy because it's just too hard to be tough all the time. In any case, an "eat-it-or-leave-it" approach misses the main point: What we really want is for children to *like* healthy foods, because food only counts if it is eaten, and in the long run children only eat what they enjoy (Roberts & Heyman, 1999).

Fortunately, knowledge of babies' and toddlers' cognitive, social, and emotional development can provide a good roadmap for actively molding and encouraging healthy food preferences. With some simple help from their parents and caregivers, children can preserve their natural ability to self-regulate caloric intake to maintain a healthy weight; be adventurous eaters who enjoy a wide range of healthy foods; be contented eaters, comfortable with family meals and family favorites; and eat an age-appropriate balance of meals and snacks. By learning how to work with, rather than against, children's natural instincts, adults can actually reduce feeding conflicts while at the same time teaching a lifelong enjoyment of healthy foods.

Teaching children to eat well using the powerful tools of development feels natural and easy, and many parents report a sense of freedom when apparently intractible struggles with a difficult eater seem to melt away. The following seven strategies are particularly helpful during the first three years, when healthy eating habits are being established:

1 Accept a division of control. One of the important elements of encouraging good eating habits is to give

children control over how much food they eat. Of course, only informed adults can make good choices about what foods children should eat in general and what particular foods are right for each meal and snack. But children have the biological signals that determine hunger, fullness and whether a particular food looks and smells appealing. What this means is that children's day-to-day calorie intakes are surprisingly constant even though any given meal may be extremely large or small (Birch et al., 1991). So parents and caregivers should focus on putting healthy foods on the table that children can reasonably be expected to enjoy, and then—most important—letting the children exercise control of portion size.

Learning to recognize children's signals of hunger and fullness is very helpful. A young infant signals hunger by crying, fist chewing, or looking irritable. An older baby signals that she wants to continue eating by learning forward, watching her bowl, and even opening her mouth for more when she has swallowed the last mouthful. As she starts to get full she will take smaller amounts off the spoon and will swallow more slowly. Finally she refuses to open her mouth, turns her head away, or lets the last spoonful dribble back out. Most two-year-olds can tell you if they are hungry, but they may not. Fussiness before lunchtime or sitting unusually pale or still usually means that a child has gotten hungry early. A small low-calorie snack will keep him in good humor until mealtime. Likewise, food signals during meals will tell you how full a child is. Most two-year-olds start off eating at a great rate when they are hungry. Big spoonfuls, crammed in at a rapid pace, are completely normal. Halfway through the meal, the child eats at a more leisurely pace, stopping to talk and look around. Toward the end of the meal, spoonfuls will go in at perhaps a quarter of the rate they did at the beginning.

Avoiding persuasion is also an important element of growing a healthy eater. As much as babies and toddlers want to imitate what and how adults eat, they'll instinctively reject foods that we actively encourage or use incentives or demands to promote. Pressure to eat healthy food, coupled with the absence of pressure to eat less-healthy food, seems to reinforce preferences for less-healthy foods.

2 Exploit the 12-to-21-month "window of opportunity" to jump-start healthy eating. From about 12 to 21 months, babies and young children try to put everything in their mouths, and it is a great time for getting all safe foods accepted and enjoyed. By the time a child is two, he or she can have a repertoire of 100 to 200 healthy foods that are recognized, eaten and enjoyed. Good foods to try include:

- All fresh fruits and vegetables—raw and cooked, plain and dressed. (Avoid hard raw vegetables such as carrots and celery until babies start chewing food, and even then cut in small strips to prevent choking.)
- Breads, low-fat crackers, low-sugar cereals, pasta, potatoes, rice, tortillas, and cooked grains. Include regular modest amounts of high-fiber types so children will learn to like them, but don't expect 12-21-month-olds to eat large portions because fiber requirements are low at this age.
- All kinds of meats, poultry, fish and shellfish, except those containing nitrites (such as most hot dogs, ham, bologna, sausage and bacon).
- Dairy products, including milk, eggs, yogurt, and cheese (butter and cream in moderation).
- Beans and peas, and bean products such as tofu.
- Foods with small amounts of spices and herbs—even tiny pieces of the herbs themselves, so that children can learn their taste.

3 Use the power of dietary variety. Most children older than about eight months instinctively seek food variety unless their life is unsettled or they are discouraged from being adventurous eaters by too much pressure. In fact, they often push their parents and caregivers to provide variety by refusing to touch what they ate yesterday. This is a common source of irritation, but can be viewed much more positively if parents think of it as nature's way of making sure that children get all the essential micronutrients they need. Almost any menu can supply enough calories and protein, but only a varied diet with a rotating supply of different vegetables, fruits and protein sources can supply the right balance of vitamins and minerals required for lifelong health (McCrory et al., 1999).

Adults can make an ally of children's variety instinct to minimize fussiness. Many food refusals are caused by boredom, and demands for less healthy foods are often a plea for something different. If children are offered a varied and interesting selection of the foods adults want them to like, and a very limited variety of less healthy items, they will naturally gravitate to the foods their caregivers want them to enjoy. A different vegetable or two with dinner every night of the week provides healthy variety, while keeping only one brand of plain cookies in the house keeps an excessive cookie habit from forming. As a general rule of thumb, offer plain staples, such as milk, bread, and cereal, which are eaten for hunger and thirst, every day. Ideally, offer variety foods, such as fruits, vegetables, entrees, and lunch dishes only every several days in the same form. Changing the appearance, taste or texture of food provides variety: Potatoes can be baked or mashed; chicken can be served as fingers or in a stir-fry.

4 Overcome two-year-old caution with the "rule of 15." Being patient with cautiousness also brings rewards. Counterbalancing the variety instinct and tremendous adventurousness of a 12- to 21-month-old is an equally powerful and instinctive cautiousness that starts to show itself slightly later, around two years of age. It can drive parents crazy if they don't know why

it's happening, and it may even make them give up on trying to introduce their children to healthy choices.

But imagine yourself at age two in the long-ago past, when humans were hunter-gatherers. You are now able to move around independently, and perhaps you are encouraged to do so because your mother has a new baby on the way. While a small amount of something poisonous would probably not kill you, a whole meal might. A tendency to nibble something several times before making a whole meal of it would enable you to find out which wild foods were good to eat while also minimizing the chance of poisoning. Put in the context of our human ancestors, the cautiousness of a two-year-old makes perfect sense. What parents and caregivers need to do about this very basic instinct is be patient but persistent. Research studies have shown that it is necessary to offer a child of two years or older a particular food up to 15 times until it is accepted and enjoyed (Birch et al., 1990). Yes, there is some potential for food waste, but children's portions are small. At home, parents can eat the food a child rejects themselves or freeze it for another meal. Don't try to offer the food in question at every meal. Let it go for several days, then offer it again. It may be rejected again—and again—and it is **very important** to treat the rejection as inconsequential. By all means say, "Okay, I'll eat it," but don't use bribery, threats, or active encouragement or you will encourage instinctive rejection. At some point the child will suddenly accept the new food, perhaps even eating a whole portion with gusto, without ever realizing that you wanted him to do so.

5 Create bridges of familiarity to speed acceptance of new foods. Children, like adults, learn by comparing new experiences to their internal blueprint of familiar ones, and this is as true for foods as for other things in life (Gemilli, 1996). Appearance, taste and texture are all things a baby or child notices when given new food, and each item is compared to memories of already-familiar foods. Thus a child recognizes that roasted chicken is similar to grilled chicken, but understands that carrots are very different. By exploiting similarities, parents can gradually move a conservative child from one similar food to another and increase the repertoire of healthy foods with minimal fuss and bother. You can also build a bridge of familiarity to rescue a difficult food. At 18 months, Dr. Roberts' daughter didn't like roast chicken, a family favorite, and seemed about to prove an exception to the rule of 15. So she was switched to chicken nuggets and chicken with barbecue sauce and enjoyed them. Pretty soon she was enjoying roast chicken, too!

6 Expect imitation—of yourself, and others. Learning by imitation is part of the social instinct we all share and is a good strategy, as the success of the human race demonstrates. This means that it is most important for parents and caretakers to be good role models and keep undesirable outside influences outside. When a nine-month-old sees you enjoying squash, she wants to do the same. The same is true for a two-and-a-half year old, although she is instinctively more conservative and may need to watch you several times before trying it. Kids learn to love virtually anything that they see their parents or caregivers really enjoy, from ants (in some parts of Africa) to raw fish (in Japan) and snails (in France). They also imitate peers. Tomatoes and carrots refused at home may become favorites when friends are observed to enjoy them.

What you don't eat at home is as important as what you do. When you keep candy out of the house, your child will probably never learn to crave it, even if you love it and eat it when you are at work. However, children will sooner or later encounter candy, potato chips, soda and other unhealthy foods at the homes of friends and family, at birthday parties, and on excursions. As they become more aware of the world around them, they may also try requesting unhealthy foods they have seen in commercials on TV. If you take the position that it is generally fine for children to try modest amounts of different things and at the same time keep outside influences outside, you establish the important principle that home food is different from outside food. Children are remarkably place-specific in their food requests, which makes maintaining a healthy home or child care menu much easier than it might sound.

7 Get young children involved with food. From the time they can walk and talk well, many children seem to like nothing better than getting involved with food. They are thrilled to plant a seed, thrilled to see that it has come up and thrilled to pick the crop when it is ready to eat. They also love to cook, and will proudly make a simple salad dressing years before they can write or count with competence. Parents can use this interest in food and growing things as a way to introduce their children to foods they otherwise might not eat, especially vegetables. Poking around the garden, making dinner together, and even talking about items while shopping together at the supermarket, can all be valuable ways to make otherwise-unglamorous foods interesting**.** Busy working parents may not have the time or energy for these activities except perhaps on weekends, but they can look for child care settings where these activities are part of the "curriculum." The chance to get meaningfully involved with food and cooking may also be something to consider, for example when trying to decide between a self-contained center in a strip mall and family day care in a "real" neighborhood where children can walk to the grocery store with their teacher and buy the ingredients for vegetable soup.

A better blueprint for the future

Eating is one of life's great pleasures and is something we should all be able to enjoy. When children are intro-

duced to healthy foods in healthy ways, they learn to actually enjoy the foods that are best for their development and long-term health. Why should the foods a child enjoys now determine future preferences? One reason lies in the way childhood memories are formed (Gemelli, 1996). Up to the age of about two-and-a-half or three years, children do not form conscious memories, but instead are busy using their daily experiences to create the instinctive emotions and likes and dislikes that will become intuitive feelings in the future. So if a young child learns to enjoy vegetables for dinner every night and fresh fruit for dessert, he incorporates these healthy foods into his developing subconscious blueprint for what a proper meal should be. Not only does it taste good to him, it feels right, too. It nourishes his soul while feeding his small but growing body.

Of course, this doesn't mean to say that children fed well in the early years won't also enjoy some of the less healthy choices they encounter in the outside world. But they will be able to keep those less healthy foods in their rightful place—which is as foods that are not part of regular life, and not enjoyed more than the healthy items they eat at home.

Helping young children develop and grow up is a wonderful task that parents, caregivers and health professionals are priviledged to share. And when you realize that your feeding skills have got those healthy foods eaten and enjoyed, you can bask in the knowledge that you have given your children one of the most important of all gifts, the best chance for a long and healthy life.

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