

## Development of the Start Healthy Feeding Guidelines for Infants and Toddlers

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The American Dietetic Association (ADA) partnered with the Gerber Products Company to establish the Start Healthy Feeding Guidelines for Infants and Toddlers to provide science-based, practical dietary and feeding guidance for healthy American infants and toddlers. The purpose of this paper is to provide a comprehensive description of the process used to develop these guidelines and to summarize how an evidence-based approach is applied to synthesize, consolidate, and update nutrition guidance for feeding infants and toddlers.

The ADA evidence-based approach was the preferred method for development of the Guidelines. However, a second method based on existing recommendations for feeding infants and toddlers was used for some guide-

line areas. A third method was required to determine nutrient needs for infants and toddlers.

The ADA evidence-based approach uses the principles of evidence-based medicine and follows the general steps used in preparation of clinical guidelines. The two principles of evidence-based medicine are as follows: (a) there is a hierarchy of evidence behind the recommendation, and (b) the clinician (expert) will exercise judgment in light of the patient's values and preferences as well as societal values (1).

The steps in the evidence-based process include the following:

- identifying a specific problem or area of uncertainty; in this project, areas for practical feeding advice;
- formulating the area as a research question;
- developing a systematic search strategy and finding evidence;
- selecting relevant evidence;
- evaluating and grading the evidence;
- forming recommendations or making decisions based on the best available evidence; and
- summarizing and disseminating the findings (2).

Content areas for the infant and toddler feeding guidelines were identified and divided into two categories: those in which existing guidance would be used as the basis for guidelines and areas in which an evidence-based approach would be used. Both methods generated questions and used the ADA evidence analysis methodology to summarize reference sources (2). Systematic literature search strategies were developed for research questions from which a formal evidence analysis was completed.

Evidence summaries and conclusion statements were developed, and evidence was graded when the evidence-based approach was used. Customized nutrition analyses were used to determine the nutrients needed from complementary foods.

### START HEALTHY PEDIATRIC ADVISORY PANEL

The authors of this paper made up the core team whose tasks included conducting the background work for the Expert Panel. The ADA trained the core team members on how to conduct an evidence-based analysis using the ADA approach and tools (eg, completing worksheets, evidence summaries).

The role of the Start Healthy Expert Panel was to direct and guide the core team in completing the various steps in developing the guidelines. From December 2002 through October 2003, the Expert Panel and the core team held three face-to-face meetings and several conference calls to develop topic areas, discuss the evidence, and provide the analysis that would be the foundation for the Start Healthy Feeding Guidelines for Infants and Toddlers.

### IDENTIFICATION OF TOPIC AREAS NEEDING GUIDANCE

The first step in the development of the guidelines was to identify the specific areas for feeding guidance. The guiding principle for selecting topics was to identify areas that would result in scientifically sound, useful, and practical advice for parents and caregivers.

As a starting point, existing feeding guidance and recommendations from organizations recognized for their ex-

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expertise in pediatric nutrition were reviewed and summarized. These included government agencies and academic and professional organizations such as the American Academy of Pediatrics (AAP), ADA, Bureau of Maternal and Child Health, Centers for Disease Control and Prevention, United States Department of Agriculture (USDA), and the World Health Organization (WHO). Twenty-nine infant and toddler feeding topics were addressed by these organizations. These were summarized to help identify the priority areas for the Start Healthy Feeding Guidelines for Infants and Toddlers (Figure 1). Factors that influenced the topic selection included the desire to create practical advice about foods and feeding and an interest in areas in which new information may be gleaned if the evidence-based approach were applied. From this review, the Panel identified five priority areas to be the focus of the Start Healthy Feeding Guidelines for Infants and Toddlers: (a) food transitions/developmental milestones, (b) variety, (c) nutrition needs, (d) safe feeding, and (e) physical activity. Figure 2 lists the 22 research questions developed that were thought to be most important to parents and would form the foundation of the guidelines. The research questions are referred to by the number given in Figure 2 throughout the other Figures in this article.

The Panel realized that the broad area of “food transitions” covered many of the practical aspects of feeding during the time when the child is transitioning from an all-milk diet to solid food. The Panel believed that this was among the most important areas in

which to provide guidance. The transitions during this time include the first introduction of solid foods in addition to breast milk or formula, adding variety and texture throughout the weaning period, and establishing healthy eating patterns. Within each of these transition periods, the questions of when, what, and how to feed emerged as the critical guidance issues. Because this was a large and complex topic area, an analytical framework was developed to organize the research questions (Figure 3). It became clear that the areas of nutrition and variety and some aspects of safe feeding (from the five priority areas) also fit within this framework.

The questions related to *when* to feed dealt with developmental readi-

ness (oral, gross and fine motor skills; gastrointestinal tract; and renal maturation) and specific textures of food appropriate at each stage. The questions regarding *what* to feed dealt with the specific food items, nutrient requirements, and nonnutritional concerns (eg, food allergies). The concept of *what* was expanded to include “what is the role of physical activity for infants and toddlers.” The questions of *how* to feed dealt with either the procedure of introducing foods (number of times new foods are offered) or the relationship of caregiver to child (such as recognizing the child’s hunger and fullness cues). Figure 4 shows how each area relates to the questions *when*, *what*, and *how* to feed.

Potential topic areas identified <sup>a</sup>	
Breastfeeding	Choking hazards
Readiness for solid foods	When to start meat
Obesity	When to start fruits & vegetables
Oral health	Use of cow’s milk
Physical activity	Juice
Iron	When to start finger foods and table foods
Food safety	Water
Use of bottles, nipples, pacifiers	Smoking
Formula feeding	Social interaction during feedings
Food allergies	Vitamin D and bone health
Dietary fat	Parents and caregivers as role models
Sugar and salt	Fiber
Variety	Encouraging acceptance of new foods
Cereal	Colic
Overfeeding & force-feeding	
<sup>a</sup> A list of organizations that provide information or advice on these topic areas is available from the authors.	

**Figure 1.** Topic areas identified for consideration in the Start Healthy Guidelines for Infants and Toddlers.

1. When do oral, gross, and fine motor skills required for complementary feeding emerge?
2. When is an infant's gastrointestinal tract capable of handling complementary foods?
3. Are there issues of renal maturation that need to be addressed when considering complementary foods?
4. When is it appropriate to introduce textures?
5. What foods should be avoided to reduce food allergy risk?
6. What are the first foods in other cultures?
7. What are infants' and toddlers' nutrient requirements?
8. What nutrients are needed from complementary foods?
9. What is the evidence that specific nutrients require special emphasis in the diets of infants and toddlers?
10. How should parents or caregivers introduce complementary foods for the first time?
11. How quickly and in what order should complementary foods be introduced?
12. How much food provides a portion or serving for infants and toddlers?
13. Does variety during the first 2 years of life increase the number of foods accepted?
14. How are early food experiences and flavors related to food preferences and food acceptance in children?
15. How many times should a food be introduced to help infants accept new foods?
16. How are picky eating and food jags described?
17. How can parents and caregivers help children accept a wider variety of foods?
18. How can parents establish a healthy feeding relationship?
19. How do infants and toddlers communicate hunger and fullness and how should parents respond?
20. How can parents and caregivers help the child develop independence in feeding?
21. How can parents and caregivers feed safely? What is the proper handling and storage time for formula and human milk? What is the proper handling and storage time for baby foods? What precautions should be taken to prevent choking in infants and toddlers? What is expert advice on critical safety issues for infants like lead poisoning, methyl mercury, pica, nitrites and herbals and supplements?
22. What is the role of physical activity for infants and toddlers?

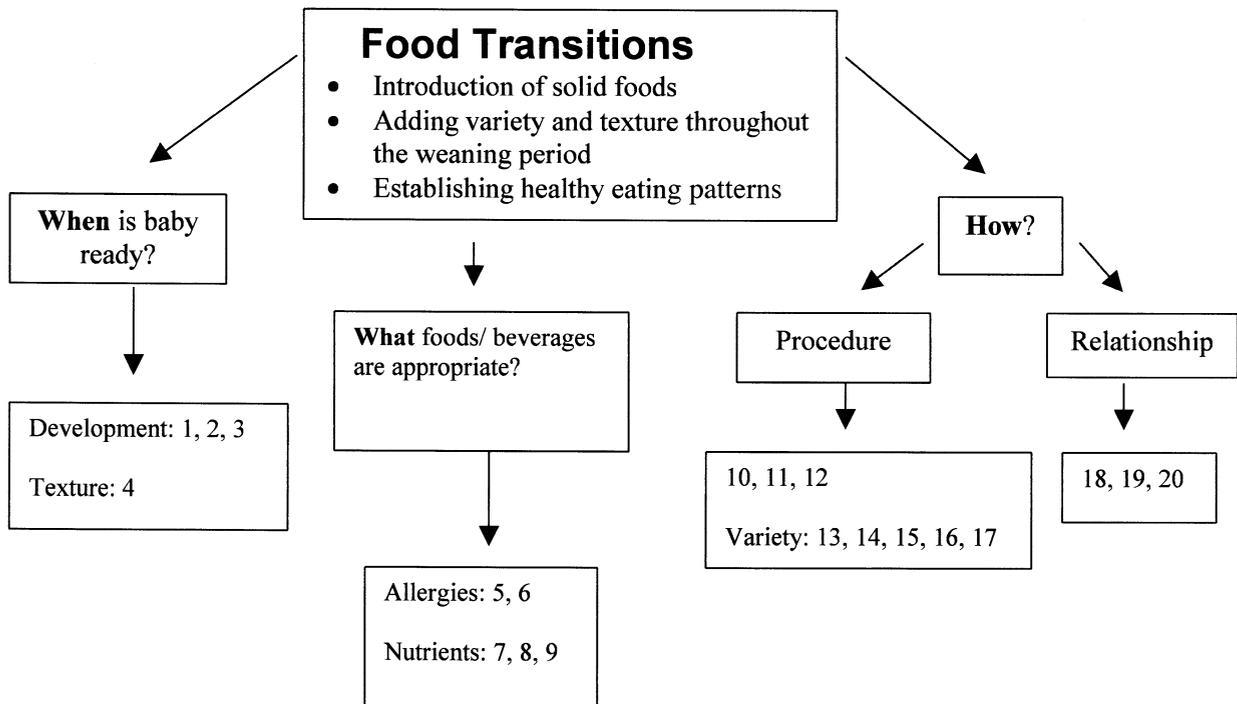
**METHODOLOGIES USED FOR GUIDELINE DEVELOPMENT**

The research questions were placed into two categories depending on the evidence analysis method selected: (A) those in which existing guidance appeared to be consistent and the Expert Panel believed to be adequately supported by evidence and (B) those in which evidence analysis may add new knowledge and insight in formulating recommendations to parents. During this process, the Expert Panel also identified (C) analysis of nutrient requirements and menu development as a priority to support realistic recommendations.

**A. Summary of Existing Guidance**

**Searching, Finding, and Selecting the Evidence.** The areas for which this methodology was employed included the following: the nutrient requirements of infants and toddlers, nutrients needing special emphasis for infants and toddlers, gastrointestinal and renal maturation, feeding patterns from other cultures, safe feeding, and physical activity. The Expert Panel selected existing recommendations as the basis for conclusion statements. Although the Expert Panel did not

**Figure 2.** Research questions developed for the Start Healthy Feeding Guidelines for Infants and Toddlers.



**Figure 3.** Analytical framework for food transitions in the Start Healthy Eating Guidelines for Infants and Toddlers (numbers refer to research questions from Figure 2).

Priority areas identified	Research questions	Consumer questions: When, What, How?
Food transitions	1-6, 10-12, 18-20	When do I feed my baby? What do I feed my baby? How do I feed my baby?
Variety	13-17	How do I feed my baby?
Nutrition	7-9	What do I feed my baby?
Safe feeding	21	How do I feed my baby?
Activity	22	What?

**Figure 4.** Start Healthy Feeding Guideline areas matched to research questions and consumer questions of *when, what, and how?*

conduct complete literature searches, they elected to provide additional review articles and select research studies for some topic areas. Figure 5 lists the questions for these areas and the expert recommendations, organizations, and additional references selected.

**Evaluating the Evidence.** The pertinent information from the existing recommendations or articles selected was abstracted and summarized on worksheets that included the full citation, summary of authors' conclusions, and type of report (eg, review article, consensus document, or expert opinion reference). Systematic review articles are review articles designed to summarize available literature on a given topic and provide clearly described methodology. Narrative review articles summarize available literature on a given topic but do not describe the methodology. Consensus statements are narrative reviews conducted by a group with the purpose of

making a statement about a particular topic. Expert opinion articles address a topic by providing the authors' informed opinion but may not review the available literature.

Cover sheets for each question were prepared that documented all of the information used, including the key points from all the recommendations and additional literature as well as an overall summary statement. The Expert Panel discussed and created the final summary statements; however, because no systematic review of the literature was conducted, these statements were not formally "graded." For the area of activity, Dr Jane Clark was consulted to describe the development of existing recommendations for activity and answer questions about research on the benefits of activity for infants and toddlers. The conclusions from these areas appear in the Start Healthy Feeding Guidelines for Infants and Toddlers appearing in this issue of the *Journal* (3).

## B. Formal Evidence Analysis

**Searching and Finding the Evidence.** The ADA evidence-based approach was employed for the areas shown in Figure 6. The search terms for each area were identified with the assistance of researchers and a librarian familiar with infant feeding. Medline and PsychINFO were used as literature databases. Exceptions were made to include some of the "classic" literature related to developmental milestones and eating skills as recommended by the Expert Panel (Figure 6), including literature that would not be available in the databases and recognized authoritative books on infant development. Dr Jennifer Fisher, a child feeding expert, provided advice on and direction to the searches related to the feeding relationship and other "how-to" feeding areas (Figure 6 questions). Dr Fisher also helped determine the appropriate selection criteria for articles in these areas. To facilitate consistency among reviews, article inclusion and exclusion criteria were established and applied to research questions in this area (Figure 7).

**Evaluating the Reports.** ADA Evidence Analysis Worksheets were used to abstract key data from the articles reviewed. The core team recorded on each worksheet the citation, type of research, quality rating, key methodology and findings, authors' conclusions, and workgroup comments. The quality was determined by applying the ADA's quality rating checklist (2).

Research question	Corresponding question <sup>a</sup>	Sources of information
2	1a	AAP and WHO (10, 11); eight additional articles (12-19).
3	1b	Renal development: WHO (11) Renal solute load (20-24)
6		Infant feeding patterns in different cultures (73-76)
7	2a	Food and Nutrition Board-Institute of Medicine/Health Canada, Dietary Reference Intake Reports (6, 25-28)
9	2c	Available clinical or biochemical evidence (29-31)
21	3e	Safe feeding issues: AAP, ADA, Maternal Child Health Bright Futures, National Network for Child Care, and USDA Child and Adult Food Care Program (57-61) Storage of breast milk (62-65) Methyl mercury and fish consumption, pica and lead poisoning, nitrite toxicity, and supplement and herbals usage in infants (66-72)
22	2e	National Association for Sport and Physical Education and AAP resources (32-38) Physical inactivity, television viewing, use of car seat/constraints, and sleep (39-56)

<sup>a</sup>The question numbers in this column correspond to the conclusion statements provided in Table 1 of the accompanying paper appearing in this issue of the *Journal* (3).

**Figure 5.** Start Healthy Feeding Guideline areas developed from existing recommendations.

Research questions	Corresponding question <sup>a</sup>	Selected search terms <sup>b</sup>	Sources of information for evidence summary	Conclusion statement grade <sup>c</sup>
1	1c	Eating or feeding or food, self feeding, respiration, oral development, oral (exploration or manipulation), mouthing sensory processing, spoon (feeding or fed), kinesthetic feedback mechanism, anatomy, physiology, fetal, human, gross motor development, trunk control, postural stability, grasp or release, self feeding, finger feeding, mouth or hand, fine motor development, fine motor skill, swallowing or biting or sucking or suckling or chewing or mastication, jaw, mandible or lip, lips, cheek, cheeks, tongue, teeth, biting [M, P]	Classic studies (77-82). Longitudinal observation data for 198 infants (78). Narrative reviews, expert opinion articles, and research studies (83-87). WHO summary (11). Supporting details related to sucking, lip closure, straw use, and mouthing (88-99).	I Good for the conclusion statement IV Expert Opinion for the synthesis of the food transitions relative to the feeding and development milestones
4	1f	Oral skill development or food texture or lumpy food or development and chewing [M, P]	Data on when infants accept foods of various textures (87, 92, 100-103). Infants' responses to foods of differing textures (92, 101, 102). Progression of textures (83, 85).	III Limited for areas about the importance of introducing texture IV Expert Opinion for the general progression of texture
5	2d	Solid foods, weaning foods, complementary foods, weaning, nutrition, introduction, food allergy, food allergen, food allergies [M]	Preventing food allergy in infants at risk of food allergy (104, 105). Consensus statements (10, 106), narrative reviews (107-113), expert opinion articles (114, 115) Incidence of food allergy among young children (116, 117).	II. Fair for research about preventing allergy in infants at risk IV. Expert Opinion for recommendations for infants not at risk
10	3c	Solid foods, weaning foods, weaning, complementary foods, method, practice, procedure, parent, caregiver [M, P]	Research studies (152-154), narrative reviews (135, 155), expert opinion (146, 156, 157), and consensus document (10).	IV Expert Opinion
11	3d	Solid foods, weaning foods, weaning, complementary foods, introduction, sequence, order, speed [M]	Research studies on parental practices (158). Reviews (159, 160). Consensus document (10). Expert opinions (161, 162). Expert opinion inconsistent with current recommendations (163).	IV Expert Opinion
12	3e	Food, portion, serving size, feeding [M]	Portion sizes for toddlers (163). Meal lengths in infants and toddlers (165). USDA guide (166). Others (157, 164).	III Limited
13, 14	3f, 1e	Picky eater, food neophobia and children, early flavor development, diet experience and acceptance of solid food, flavor variety and food acceptance and infants [M, P]	Research studies on children's early experiences on later preferences (167-170). Narrative reviews (130, 171). Expert organization comments on dietary variety (10, 40, 58, 59).	III Limited for introducing variety and its impact on accepting foods

<sup>a</sup>The questions listed in this column are from the conclusion statements provided in Table 1 of the accompanying paper in this issue of the *Journal* (3).

<sup>b</sup>All searches included these terms: infant, infants, baby, babies, toddler, and toddlers. Searches from Medline are indicated by M, those from PsychINFO are indicated by P.

<sup>c</sup>Conclusion statement grades as defined in reference (4).

Figure 6. Start Healthy Feeding Guideline areas developed from the ADA Evidence-Based Analysis process. (Continued on following page.)

## OF PROFESSIONAL INTEREST

Research questions	Corresponding question <sup>a</sup>	Selected search terms <sup>b</sup>	Sources of information for evidence summary	Conclusion statement grade <sup>c</sup>
15	3f	Picky eater, food neophobia and children, early flavor development, diet experience and acceptance of solid food, flavor variety and food acceptance and infants [M, P]	Research studies on number of times a food should be offered (170, 172-174). Number of times parents <i>do</i> offer new foods (176). Existing recommendation (59).	II Fair for evidence about repeated exposures
16, 17	3g	Picky eater, food neophobia and children, early flavor development, diet experience and acceptance of solid food, flavor variety and food acceptance and infants [M, P]	Research studies on growth patterns between picky and nonpicky children (176) and association between perception of picky eating and offering of dietary variety (170). Narrative reviews (175). Expert groups (10, 59).	IV Expert opinion for how to help parents with picky eating and food jags
18	3a	Child, parent, caregiver, preference, acceptance, feeding, feeding relationship, eating, intake, overfeeding, underfeeding, overeating, under eating, barrier, problem, refusal, preference, interaction, feeding practice, nurturing, clean plate, feeding style, variety, responsiveness, eating pattern, behavior, feeding behavior, cue, coercive, bribe, reward, prompt, encourage or discourage, maternal influence or compliance or influence or parental control or pressure to eat [M, P]	Research studies (73, 118-129), narrative reviews (130-136), and expert opinion articles (83, 137-147). Conclusion limited to 20 articles given a neutral or positive rating. Focus groups (118, 128), descriptive studies (119-123, 125), cohort study (124), and case studies (73). Conclusion statement based on four narrative reviews (73, 130, 135, 136) and eight expert opinion articles (137-141, 143, 144, 147).	IV Expert opinion for how-to procedures
19	3b	Parental, control, involvement, influence, fullness cues, hunger cues, feeding cues, feeding behavior, satiety, satisfied, self control, self regulation, intake, regulation, energy regulation, parent, caregiver [M, P]	Research studies on parental responses to satiety cues (126, 127) and focus groups from WIC (148). Narrative reviews (131, 134, 135, 149). Expert opinion (132, 142, 145, 150, 151).	IV Expert opinion
20	3h	Feeding or eating, intake, parent or caregiver, feeding development or feeding behavior or feeding relationship, self feeding, developmental skill, developmental appropriateness, choice, freedom, autonomy or independence [M, P]	Research studies (120, 177-179), narrative review (180), and expert opinion (83). How parents can help the child develop independence in feeding (120). Cultural differences (177, 178). Cup feeding (179).	III Limited

Figure 6 (continued).

Once the core team members abstracted all the pertinent articles for each research question, they prepared an evidence summary, proposed a conclusion statement with a suggested evidence grade and submitted these to the Expert Panel for review. Additional experts were con-

sulted in specific areas. For the oral, gross, and fine motor development area, child development experts Dr. Dusick, Ms. Erhardt, and Dr. Morris reviewed the synthesized development chart (3). Dr. Clark reviewed the final conclusion for activity and provided suggestions for the impor-

tant message for parents and caregivers in this area. The Expert Panel reviewed and developed the final conclusion statements and grades. The grades for conclusions were those used in the ADA evidence analysis system, Grades I through IV (taken from Myers and colleagues [4]). The

1. Age under 2 years: Generally, included only if sample less than 2 years of age. For the feeding relationship work, more specific criteria were used: children from 0 to 6 months, 6 to 12 months, and 1 to 3 years. In the case that 2- to 3-year-olds are included in baby sample, the mean of the sample must be less than or equal to 2 years and/or only data for groups of children less than 3 may be included.
2. Healthy children: Specific descriptors about the patient population that will be excluded are reports regarding premature, low-birth-weight infants, and twins, as well as babies with chronic medical conditions, temporary illness, eating disorders, congenital abnormalities, developmental delays, and nonorganic failure to thrive. The exception is food allergy, where studies of infants with food allergy or at risk for food allergy were included. In the developmental area, studies of delayed children were included if data about a normal control group were available.
3. Maternal population: Specific descriptors about the maternal population that will be excluded are reports involving mothers with chronic medical problems, eating disorders, drug use/drug addiction, and clinical depression or other psychiatric disorders.
4. Sample size: The study sample size must equal 10 for each study group. Some exceptions were made and noted. If the dropout rate is 20% or greater, the study will be rejected (a Cochrane Systematic Review requirement).
5. Specific descriptors about the population that will be evaluated should include areas such as child sex, age, and weight, as well as maternal age and demographics (ethnicity, education, income).
6. Review articles: If an author writes more than one review article that is similar in content, the most recent review will be accepted and the early version may be rejected. If an author writes more than one review article and the content is different, then both reviews may be accepted.
7. Studies available in the Medline and PsychINFO databases were considered as noted. Additional classic references were selected for development. Additional expert opinion such as AAP, WHO, and USDA was also included.
8. Focus groups about issues relevant to infants and toddlers less than 3 years of age were included in the "how to feed" research areas.
9. Only studies of healthy children in developed countries reported in English will be accepted.

**Figure 7.** Criteria used to select articles for the evidence-based review.

conclusions from these areas appear in the Start Healthy Feeding Guidelines for Infants and Toddlers (3).

### C. Nutrient Needs

**Searching, Finding, and Selecting the Evidence.** The Expert Panel selected the Dietary Reference Intakes (DRIs) issued by the Food and Nutrition Board, Institute of Medicine/Health Canada as the definitive source for nutrient requirements for healthy infants and toddlers and the information needed to answer the research question: "What are the nutrient requirements of infants and toddlers?" This was supplemented with biochemical or clinical evidence of nutrient deficiency among infants and toddlers. The use of the DRIs recognized that all essential nutrients are important for infants and toddlers, and the biochemical data identified any nutrients that warranted additional emphasis.

**Determination of Nutrient Needs From Complementary Foods.** To provide practical information about types and amounts of foods for infants, it was necessary to determine the amounts of energy and nutrients needed from complementary foods. The Expert Panel adapted the method used by the WHO, which involves subtracting the nutrients supplied by an average intake of human milk from recommended intake levels to determine nutrients needed (5). The estimated energy requirements (EER) were determined for 6- to 24-month-old children at the 50th percentile for weight from the CDC growth charts (6,7). For infants 6 to 12 months of age, energy needed from complementary foods was the difference between the EER of the infant at the 50th percentile and the energy from human milk. The EER is defined as the dietary energy intake that is predicted to maintain energy balance (and support growth in children) in a healthy individual

(6). Other nutrients that need to be supplied by complementary foods were calculated to be the differences between the Adequate Intake (AI) or Recommended Daily Allowance (RDA) for the nutrient and the intake of the nutrient from human milk. For toddlers 12 to 24 months of age, we used the EER at the 50th percentile to represent total energy requirements and the DRIs for children 1 to 3 years of age to represent nutrient requirements.

**Evaluation of Nutrients in Sample Menus.** Registered dietitians prepared sample menus for infants 6 to 8 and 9 to 12 months of age and toddlers 12 to 17 and 18 to 24 months of age. The menus were designed to meet the nutrient goals described above, and their nutrient content was analyzed using the Nutrition Data System for Research software version 4.03, developed by the Nutrition Coordinating Center, University of Minnesota, Minneapolis (8). Menu planning guidelines included the AAP recommendations for appropriate use of juice and whole cow milk (9,10). From this analysis, the Panel identified areas requiring careful dietary planning to meet nutrient goals. Specific foods that provide important nutrients for infants and toddlers also were identified. The Panel also concluded from this analysis that there is little room in the diets of infants and toddlers for foods that are high in calories and low in other nutrients (eg, sweetened beverages, candy).

### TRANSLATION INTO NUTRITION GUIDELINES FOR PARENTS

Once all the evidence summaries and conclusion statements were completed, the Expert Panel synthesized the science and provided suggestions for the context that might be appropriate for consumer messages in each of the following areas: *When* do I feed my baby? *What* foods do I feed my baby? *How* do I feed my baby? The companion paper provides the conclusion statements from the research cited here as well as the Panel's insights into especially critical areas for establishing feeding guidelines (3). That paper includes a developmental chart for health professionals, a list of complementary foods that provide the needed nutrients, and information to form practical tips to encourage vari-

ety, help picky eaters, and establish healthy eating habits.

## NEXT STEPS AND LESSONS LEARNED

### Educational Materials and Evidence Analysis

The next step is to determine, for both consumers and professionals, the appropriate materials to communicate the guidelines. To determine their usefulness, the materials will need to be tested with both groups. The foods and portions from the sample menus will be made available, along with the chart of developmental milestones and eating skills.

The full evidence analysis (worksheets, evidence summaries, and corresponding conclusion statements) is an invaluable resource for practitioners and researchers. Methods of disseminating these results via the Internet are being explored.

### Advice for Future Projects

Groups that decide to use an evidence-based approach for population-based practical guidelines should consider the following:

- All members involved in the process should receive training in the evidence-based analysis process being used;
- include a librarian who understands the scientific literature and search strategies as part of the core team;
- allow ample time for conducting literature searches, sorting articles for the critical studies and papers, and discussing decisions;
- engage experts in areas not represented on staff or advisory panel; and
- create a check and balance system to ensure consistency in how all worksheets and evidence summaries are completed.

### SUMMARY

This paper outlines the three different methods used to develop the Start Healthy Feeding Guidelines for Infants and Toddlers. The resulting consensus on each guideline area is given in the accompanying paper (3), which should prove useful for both parents and professionals.

### References

1. Guyatt GH, Haynes RB, Jaeschke RZ, Cood DJ, Green L, Naylor CD, Wilson MC, Richardson WS. Users' guides to the medical literature: XXV. Evidence-based medicine: Principles for applying the Users' Guides to patient care. Evidence-based medicine working group. *J Am Med Assoc.* 2000; 284:1290-1296.
2. Myers EF, Splett PL. Research in evidence-based practice, In: Monsen ER, ed. *Research: Successful Approaches.* Chicago: American Dietetic Association; 2003:164-184.
3. Butte N, Cobb K, Dwyer J, Graney L, Heird W, Rickard K. The Start Healthy Feeding Guidelines for Infants and Toddlers. *J Am Diet Assoc.* 2004;104: 442-454.
4. Myers EF, Pritchett E, Johnson E. Evidence-based practice guides vs. protocols: What's the difference? *J Am Diet Assoc.* 2001;101:1086-1090.
5. Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. *Food Nutr Bull.* 2003;24:5-28.
6. Institute of Medicine. Food and Nutrition Board. *Dietary Reference Intakes: Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids.* Washington, DC: National Academy Press; 2002.
7. Kuczmarski RJ, Ogden CL, Gummer-Strawn LM, Flegal KM, Guo SS, Wei R, Mei Z, Curtin LR, Roche AF, Johnson CL. CDC Growth Charts: United States. Advance Data from Vital and Health Statistics of the Centers for Disease Control and Prevention/National Center for Health Statistics. Number 314, December 4, 2000 (revised).
8. Schakel SF, Sievert YA, Buzzard IM. Sources of data for developing and maintaining a nutrient database. *J Am Diet Assoc.* 1988; 88:1268-1271.
9. Committee on Nutrition. The use and misuse of fruit juice in pediatrics. *Pediatrics.* 2001;107: 1210-1213.
10. Kleinman RE. *American Academy of Pediatrics Committee on Nutrition. Pediatric Nutrition Handbook.* Fourth Edition. Elk Grove Village, IL: American Academy of Pediatrics; 1998.
11. Brown K, Dewey K, Allen L. *Complementary Feeding of Young Children in Developing Countries: A Review of Scientific Knowledge.* Geneva, Switzerland: World Health Organization; 1998.
12. Lebenthal E. Impact of digestion and absorption in the weaning period on infant feeding practices. *Pediatrics.* 1985; 75:207-213.
13. Montgomery RK, Grand RJ. Gastrointestinal development: implications for infant feeding. In: Walker WA, Watkins JB, Duggan C, Becker BC, eds. *Nutrition in Pediatrics.* Hamilton, Ontario: BC Becker; 2003.
14. Montgomery RK, Mulberg AE, Grand RJ. Development of the human gastrointestinal tract: Twenty years of progress. *Gastroenterology.* 1999;116:702-731.
15. Ziegler EE. Milks and formulas for older infants. *J Pediatr.* 1990;117:S76-S79.
16. Ziegler E, Jiang T, Romera E, Vinco A, Frantz J, Nelson S. Cow's milk and intestinal blood loss late in infancy. *J Pediatr.* 1999;135:720-726.
17. Tianan J, Jeter J, Nelson S, Ziegler E. Intestinal blood loss during cow milk feeding in older infants. *Arch Pediatr Adolesc Med.* 2000;154:673-678.
18. Ziegler E, Fomon S, Nelson S, Rebouche C, Edwards B, Rogers R, Lehman L. Cow milk feeding in infancy: Further observations on blood loss from the gastrointestinal tract. *J Pediatr.* 1990; 116:11-18.
19. Fuchs G, DeWier M, Hutchinson S, Sundeen M, Schwartz S, Suskind R. Gastrointestinal blood loss in older infants: Impact of cow milk versus formula. *J Pediatr Gastroenterol Nutr.* 1993; 16:4-9.
20. Ernst JA, Brady MS, Rickard KA. Food and nutrient intake of 6- to 12-month-old infants fed formula or cow milk: A summary

- of four national surveys. *J Pediatr*. 1990;117:S86-S100.
21. Marlin DW, Picciano MF, Livant EC. Infant feeding practices. *J Am Diet Assoc*. 1980;77:668-676.
  22. Fomon SJ. Feeding normal infants: Rationale for recommendations. *J Am Diet Assoc*. 2001;101:1002-1005.
  23. Fomon SJ, Ziegler EE. Renal solute load and potential renal solute load in infancy. *J Pediatr*. 1999;134:11-14.
  24. Fomon SJ. Potential renal solute load: Considerations relating to complementary feedings of breastfed infants. *J Pediatr*. 2000;106:1284.
  25. Institute of Medicine. Food and Nutrition Board. *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc*. Washington, DC: National Academy Press; 2001.
  26. Institute of Medicine. Food and Nutrition Board. *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids*. Washington, DC: National Academy Press; 1997.
  27. Institute of Medicine. Food and Nutrition Board. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. Washington, DC: National Academy Press; 1998.
  28. Institute of Medicine. Food and Nutrition Board. *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*. Washington, DC: National Academy Press; 1997.
  29. Centers for Disease Control and Prevention. Recommendations to Prevent and Control Iron Deficiency in the United States. *MMWR*. April 3, 1998.
  30. Centers for Disease Control and Prevention. Pediatric Nutrition Surveillance data—Growth and anemia indicators by race/ethnicity and age. 2001.
  31. Gartner LM, Greer FR, and the Section on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency: new guidelines for vitamin D intake. *Pediatrics*. 2003;111:908-910.
  32. Clark JE, Clemints RL, Gudemi M, Morgan DW, Pica R, Pivarnik JM, Rudisill M, Small E, Virgilio SJ. "Active Start: A Statement of Physical Activity Guidelines for Children Birth to Five Years." Reston, VA: National Association for Sport and Physical Education; 2002.
  33. Shelov S. *American Academy of Pediatrics Caring for Your Baby and Young Child—Birth to Age 5*. New York, NY: Bantam Books; 1998.
  34. American Academy of Pediatrics Committee on Public Education. Policy statement: Children, adolescents and television. *Pediatrics*. 2001;107:423-426.
  35. American Academy of Pediatrics Committee on Injury and Poison Prevention. Injuries associated with infant walkers. *Pediatrics*. 2001;108:790-792.
  36. American Academy of Pediatrics Committee on Sports Medicine. Infant exercise programs. *Pediatrics*. 1988;82:800.
  37. American Academy of Pediatrics Committee on Sports Medicine and Fitness and Committee on School Health. Policy statement: Physical fitness and activity in schools (RE9907). *Pediatrics*. 2001;105:115-117.
  38. American Academy of Pediatrics. Establishing good sleep habits. 1999. Available at: [http://www.medem.com/search/article\\_display.cfm?path=n:&mstr=ZZZYCAGNH4C.html&soc=AAP&srch\\_typ=NAV\\_SERCH](http://www.medem.com/search/article_display.cfm?path=n:&mstr=ZZZYCAGNH4C.html&soc=AAP&srch_typ=NAV_SERCH). Accessed November 21, 2003.
  39. Abbott AL, Bartlett DJ. Infant motor development and equipment use in the home. *Child Care Health Dev*. 2001;3:295-306.
  40. American Heart Association Scientific Statement. Cardiovascular Health in Childhood. A statement for health professionals from the Committee on Atherosclerosis, Hypertension, and Obesity in the Young (AHOY) of the Council on Cardiovascular Disease in the Young, American Heart Association. *Circulation*. 2002;106:143-160.
  41. American Medical Association. Sleep and your 1-3 month old. 1997. Available at: [http://www.medem.com/search/article\\_display.cfm?path=n:&mstr=ZZZEM8KW59C.html&soc=AMA&srch\\_typ=NAV\\_SERCH](http://www.medem.com/search/article_display.cfm?path=n:&mstr=ZZZEM8KW59C.html&soc=AMA&srch_typ=NAV_SERCH). Accessed November 21, 2003.
  42. American Public Health Association Resolution on Overweight in Childhood. 2001. Available at: <http://www.apha.org/legislative/policy/policysearch/index.cfm>. Accessed November 21, 2003.
  43. Patrick K, Spear B, Holt K, Sofka D. *Bright Futures in Practice: Physical Activity*. Arlington, VA: National Center for Education in Maternal and Child Health; 2001.
  44. Certain L, Kahn R. Prevalence, correlates and trajectory of television viewing among infants and toddlers. *Pediatrics*. 2002;109:634-632.
  45. Garrett M, McElroy AM, Staines A. Locomotor milestones and babywalkers: Cross sectional study. *Br Med J*. 2002;324:1494.
  46. Kohl H, Hobbs K. Development of physical activity behaviors among children and adolescents. *Pediatrics*. 1998;101:549-554.
  47. McEwan MH, Dihoff RE, Brosvic GM. Early infant crawling experience is reflected in later motor skill development. *Percept Mot Skills*. 1991;72:75-79.
  48. National Institute of Child Health and Human Development. SIDS: "Back to Sleep" Campaign. Babies sleep safest on their backs: Reduce the risk of sudden infant death syndrome. October 2002. Available at: [http://www.nichd.nih.gov/sids/reduce\\_infant\\_risk.htm](http://www.nichd.nih.gov/sids/reduce_infant_risk.htm). Accessed November 21, 2003.
  49. Ogden C, Troiano R, Briefel R, Kuczmarski R, Flegal K, Johnson C. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *J Am Med Assoc*. 2002;288:1728-1732.
  50. Parsons TJ, Power C, Logan S, Summerbell CD. Childhood predictors of adult obesity: A systematic review. *Int J Obes Relat Metab Disord*. 1999;23(suppl 8):S1-S107.
  51. Power C, Parsons T. Nutrition and other influences in childhood as predictors of adult obesity. *Proc Nutr Soc*. 2000;59:267-272.
  52. Salls JS, Silverman LN, Gatty

- CM. The relationship of infant sleep and play positioning to motor milestone achievement. *Am J Occup Ther.* 2002;56:577-580.
53. Siegel AC, Burton RV. Effects of baby walkers on motor and mental development in human infants. *J Dev Behav Pediatr.* 1999;20:355-361.
  54. US Department of Health and Human Services. The Surgeon General's call to action to prevent and decrease overweight and obesity. Rockville, MD: US Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2001.
  55. Wells JC, Ritz P. Physical activity at 9-12 months and fatness at 2 years of age. *Am J Human Biol.* 2001;13:384-389.
  56. Wells JC, Stanley M, Laidlaw AS, Day JM, Davies PS. The relationship between components of infant energy expenditure and childhood body fatness. *Int J Obes Relat Metab Disord.* 1996;20:848-853.
  57. American Academy of Pediatrics. *New Mother's Guide to Breast-feeding.* New York: Bantam Books; 2002.
  58. American Dietetic Association. Nutrition standards for child-care programs. *J Am Diet Assoc.* 1999;99:981-988.
  59. Story M, Holt K, Sofka D, Clark EM. "Bright Futures in Practice: Nutrition." Arlington, VA: National Center for Education in Maternal and Child Health; 2002.
  60. Oesterreich L. Feeding infants. In: Oesterreich L, Holt B, Karas S, eds. *Iowa Family Child Care Handbook* [Pm 1541]. Ames, IA: Iowa State University, 1995. Available at: [www.nccc.org/Nutrition/feed.infants.html](http://www.nccc.org/Nutrition/feed.infants.html). Accessed November 21, 2003.
  61. USDA Food and Nutrition Service. (FNS-258). Feeding Infants: A Guide for Use in the Child Nutrition Programs.
  62. Ogundele MO. Techniques for the storage of human breast milk: implications for anti-microbial functions and safety of stored milk. *Eur J Pediatr.* 2000;159:793-797.
  63. Disney G. University of Tennessee Institute of Agriculture, USDA Safe Food for Baby, 1997. Available at: <http://www.utextension.utk.edu/spfiles/sp495.pdf>. Accessed February 7, 2003.
  64. Department of Health and Human Services Office on Women's Health. Breastfeeding made easier at home and work: Storing Breast Milk. Available at: <http://www.4woman.gov/breastfeeding/print-bf.cfm?page=237>. Accessed February 7, 2003.
  65. World Health Organization. Infant and young child nutrition—global strategy for infant and young child feeding. April 16, 2002. Available at: [http://www.who.int/gb/EB\\_WHA/PDF/WHA55/ea5515.pdf](http://www.who.int/gb/EB_WHA/PDF/WHA55/ea5515.pdf). Accessed February 7, 2003.
  66. Environmental Protection Agency. How lead affects the way we live and breath. Available at: <http://www.epa.gov/air/urbanair/lead/index.html>. Accessed November 21, 2003.
  67. Agency for Toxic Substances and Disease Registry. The child as susceptible host: a developmental approach to pediatric environmental medicine. Available at: <http://www.atsdr.cdc.gov/HEC/CSEM/pediatric/susceptible.html#host>. Accessed November 21, 2003.
  68. Centers for Disease Control. About childhood lead poisoning. Available at: <http://www.cdc.gov/nceh/lead/about/about.htm>. November 21, 2003.
  69. Food and Drug Administration Center for Food Safety and Applied Nutrition. Rationale for issuance of revised advisory on methyl mercury and fish consumption and Consumer Advisory 2001. Available at: <http://www.cfsan.fda.gov/~dms/hgpdfoc.html>. Accessed November 21, 2003.
  70. Environmental Protection Agency. Tips to protect children from environmental risks. Available at: <http://yosemite.epa.gov/ochp/ochpweb.nsf/content/tips.htm>. Accessed November 21, 2003.
  71. Keyser SL. Nitrates and nitrites. June 1997. Available at: <http://ace.orst.edu/info/extoxnet/faqs/safedrink/nitrates.htm>. Accessed November 21, 2003.
  72. Skipton S, Hay D. Drinking water: nitrate and methemoglobinemia. Nebraska Cooperative Extension G98-1369. July 1995. Available at: <http://www.ianr.unl.edu/pubs/water/g1369.htm>. Accessed November 21, 2003.
  73. Pelto G, Levitt E, Thairu L. Improving feeding practices: current patterns, common constraints and the design of interventions. *Food Nutr Bull.* 2003;24:45-82.
  74. Cooper RL, Cooper MM. Red pepper-induced dermatitis in breast-fed infants. *Dermatology.* 1996;193:61-62.
  75. Khan ME. Breast-feeding and weaning practices in India. *Asia-Pac Popul J.* 1990;5:71-88.
  76. Chinese Nutrition Society. Dietary Guidelines—Recommendations for particular groups of people—Infants. Available at: <http://www.cnsoc.org/sszn1e0.htm>. Accessed November 21, 2003.
  77. Halverson HM. An experimental study of prehension in infants by means of systematic cinema records. *Genet Psychol Monogr.* 1931;10:107-286.
  78. Gessell A, Ilg F. *Feeding Behavior of Infants: A Pediatric Approach to the Mental Hygiene of Early Life.* Philadelphia, PA: J. B. Lippincott Company; 1937.
  79. Gesell A. *The First Five Years of Life: A Guide to the Study of the Preschool Child.* New York, NY: Harper & Brothers; 1940.
  80. Gesell A, Ilg F, Ames LB, Rodell JL. *Infant and Child in the Culture of Today: the Guidance of Development in Home and Nursery School.* New York: Harper & Row Publishers; 1974.
  81. Illingworth RS, Lister J. The critical or sensitive period, with special reference to certain feeding problems in infants and children. *J Pediatr.* 1964;65:839-848.
  82. Cohen MA, Gross PJ. *The Developmental Resource: Behavioral Sequences for Assessment and Program Planning Volume 1.* New York, NY: Grune & Stratton; 1979.
  83. Pridham KF. Feeding behavior of 6- to 12-month-old infants: Assessment and sources of parental information. *J Pediatr.* 1990; 117:S174-S180.
  84. Meyer PG. Tongue and lip and jaw differentiation and its rela-

- tionship to orofacial myofunctional treatment. *Int J Orofacial Myology*. 2000;26:44-52.
85. Morris SE, Klein MD. Pre-Feeding Skills, 2nd edition. San Antonio, TX: Therapy Skill Builders; 2000.
  86. Tamura F, Chigira A, Ishii H, Nishikata H, Mukai Y. Assessment of the development of hand and mouth coordination when taking food into the oral cavity. *Int J Orofacial Myology*. 2000; 26:33-43.
  87. Carruth BR, Skinner JD. Feeding behaviors and other motor development in healthy children (2-24 months). *J Am Col Nutr*. 2002;21:88-96.
  88. Ayano R, Tamura F, Ohtsuka Y, Mukai Y. The development of normal feeding and swallowing: Showa University study of the feeding function. *Int J Orofacial Myology*. 2000;26:24-32.
  89. Beal VA. On the acceptance of solid foods, and other food patterns, of infants and children. *Pediatrics*. 1957;20:448-457.
  90. Bu'Lock F, Woolridge MW, Baum JD. Development of co-ordination of sucking, swallowing and breathing: Ultrasound study of term and pre-term infants. *Dev Med Child Neurol*. 1990;32: 669-678.
  91. Chigira A, Omoto K, Mukai Y, Kaneko Y. Lip closing pressure in disabled children: A comparison with normal children. *Dysphagia*. 1994;9:193-198.
  92. Gisel EG. Effect of food texture on the development of chewing of children between six months and two years of age. *Dev Med Child Neurol*. 1991;33:69-79.
  93. Hunt L, Lewis D, Reisel S, Waldrup L, Wooster A, Donna M. Age norms for straw-drinking ability. *Infant-Toddler Intervention*. 2000;10:1-8.
  94. Schulze PA, Harwood RL, Schoelmerich A. Feeding practices and expectations among middle-class Anglo and Puerto Rican mothers of 12-month-old infants. *J Cross-Cultural Psychol*. 2001;32:397-406.
  95. Tolve NS, Suggs JC, McCurdy T, Cohen HE, Moya J. Frequency of mouthing behavior in young children. *J Expo Anal Environ Epidemiol*. 2002;12:259-264.
  96. Vestergaard M, Obel C, Henriksen TB, Sorensen HT, Skajaa E, Ostergaard J. Duration of breastfeeding and developmental milestones during the latter half of infancy. *J Department Obstet Gynaecol, Acta Paediatr*. 1999;88:1327-1332.
  97. Young B, Drewett R. Eating behaviour and its variability in 1-year-old children. *Appetite*. 2000;35:171-177.
  98. Wolff PH. The serial organization of sucking in the young infant. *Pediatrics*. 1968;42:943-956.
  99. Wright JT. Normal formation and development defects of the human dentition. *Pediatr Clin North Am*. 2000;47:975-1000.
  100. Green JR, Moore CA, Ruark JL, Rodda PR, Morvee WT, VanWitzenburg MJ. Development of chewing in children from 12 to 48 months: Longitudinal study of EMG patterns. *J Neurophysiol*. 1997;77:2704-2716.
  101. Lundy B, Field T, Carraway K, Hart S, Malphurs J, Rosenstein M, Palaez-Nogueras M, Coletta F, Ott D, Hernandez-Reif M. Food texture preferences in infants versus toddlers. *Early Child Dev Care*. 1998;146:69-85.
  102. Northstone K, Emmett P, Nethersole F. The effect of age of introduction to lumpy solids on foods eaten and reported feeding difficulties at 6 and 15 months. *J Hum Nutr Diet*. 2001;14:43-54.
  103. Sheppard JJ, Mysak ED. Ontogeny of infantile oral reflexes and emerging chewing. *Child Dev*. 1984;55:831-843.
  104. Bardare M, Vaccari A, Allievi E, Brunelli L, Coco F, de Gaspari GC, Flauto U. Influence of dietary manipulation on incidence of atopic disease in infants at risk. *Ann Allergy*. 1993;71:366-371.
  105. Zeiger RS, Heller S, Mellon MH, Forsythe AB, O'Connor RD, Hamburger RN, Schatz M. Effect of combined maternal and infant allergen avoidance on development of atopy in early infancy: A randomized study. *J Allergy Clin Immunol*. 1989;84:72-89.
  106. Høst A, Koletzko B, Dreborg S, Muraro A, Wahn U, Aggett P, Bresson J-L, Hernell O, Lafeber H, Michaelsen KF, Micheli J-L, Rigo J, Weaver L, Heymans H, Strobel S, Vandenplas Y. Dietary products used in infants for treatment and prevention of food allergy. Joint statement of the European Society for Paediatric Allergology and Clinical Immunology and European Society for Paediatric Gastroenterology, Hepatology and Nutrition. *Arch Dis Child*. 1999;81: 80-84.
  107. Businco L, Bruno G, Giampietro PG, Ferrara M. Is prevention of food allergy worthwhile? *J Invest Allergol Clin Immunol*. 1993;3:231-236.
  108. Halken S, Host A. Prevention. *Curr Opin Allergy Clin Immunol*. 2001;1:229-236.
  109. Chandra RK. Food allergy. *Indian J Pediatr*. 2002;69:251-255.
  110. Foucard T. Development of food allergies with special reference to cow's milk allergy. *Pediatrics*. 1985;75:177-181.
  111. Koletzko B. Complementary foods and the development of food allergy. *Pediatrics*. 2000; 106:1285.
  112. Mofidi S. Nutritional management of pediatric food hypersensitivity. *Pediatrics*. 2003;111: 1645-1653.
  113. American Academy of Allergy Asthma & Immunology. The Allergy Report. 2000. Available at: <http://www.theallergyreport.org/reportindex.html>. Accessed November 21, 2003.
  114. Arshad SH. Food allergen avoidance in primary prevention of food allergy. *Allergy*. 2001;56:113-116.
  115. Wolfe SP. Prevention programmes—A dietetic minefield. *Eur J Clin Nutr*. 1995;49:S92-S99.
  116. Sampson H. Food Allergy. *J Am Med Assoc*. 1997;278:1888-1894.
  117. Formanek R. Food allergies—When food becomes the enemy. *FDA Consumer Magazine*. July-August 2001.
  118. Baughcum AE, Burklow KA, Deeks CM, Powers SW, Whittaker RC. Maternal feeding practices and childhood obesity: A focus group study of low-income mothers. *Arch Pediatr Adolesc Med*. 1998;152:1010-1014.

119. Black M, Siegel E, Abel Y, Bentley ME. Home and videotape intervention delays early complementary feeding among adolescent mothers. *Pediatrics*. 2001; 107:67.
120. Bober SJ, Humphry R, Carswell HW, Core AJ. Toddlers' persistence in the emerging occupations of functional play and self-feeding. *Am J Occup Ther*. 2001; 1:369-37655.
121. Hagekull B, Dahl M. Infants with and without feeding difficulties: maternal experiences. *Int J Eat Disord*. 1987;6:83-98.
122. Humphry R, Thigpen-Beck B. Caregiver role: Ideas about feeding infants and toddlers. *Occup Ther J Res*. 1997;17:237-263.
123. Klesges RC, Coates TJ, Brown G, Sturgeon-Tillisch J, Moldenhauer-Klesges LM, Holzer B, Woolfrey J, Vollmer J. Parental influences on children's eating behavior and relative weight. *J Appl Behav Anal*. 1983;16:371-378.
124. Kramer MS, Barr RG, Leduc DG, Boisjoly C, McVey-White L, Pless IB. Determinants of weight and adiposity in the first year of life. *J Pediatr*. 1985;06:10-14.
125. Mogan J. Parental weight and its relation to infant feeding patterns and infant obesity. *Int J Nurs Stud*. 1986;23:255-264.
126. Morris SS, Farrier SC, Rogers CS, Taper LJ. Feeding behaviors, food attitudes, and body fatness in infants. *J Am Diet Assoc*. 1982;80:330-334.
127. Morris SS, Rogers CS, Taper LJ. Care-giving behaviors in feeding 3-, 13-, and 23-month-old infants. *Nutr Behav*. 1983;1:147-156.
128. Omar MA, Coleman G, Hoerr S. Healthy eating for rural low-income toddlers: Caregivers' perceptions. *J Community Health Nurs*. 2001;18:93-106.
129. Scaglioni S, Agostoni C, DeNotaris R, Radaelli G, Radice N, Valenti M, Giovannini M, Riva E. Early macronutrient intake and overweight at five years of age. *Int J Obes*. 2000;24:777-781.
130. Birch LL. Psychological influences on the childhood diet. *J Nutr*. 1998;28:407S-410S.
131. Brayden RM, Poole SR. Common behavioral problems in infants and children. *Primary Care*. 1995;22:81-97.
132. Christophersen ER, Hall CL. Eating patterns and associated problems encountered in normal children. *Issues Compr Pediatr Nurs*. 1978;3:1-16.
133. Dettwyler KA. Styles of infant feeding: Parental/caretaker control of food consumption in young children. *Am Anthropol*. 1989;91:696-703.
134. Mentro AM, Steward DK, Garvin BJ. Infant feeding responsiveness: a conceptual analysis. *J Adv Nurs*. 2002;37:208-216.
135. Satter E. The feeding relationship. In: Kessler DB, Dawson P, eds. Failure to Thrive and Pediatric Undernutrition: A Transdisciplinary Approach. Baltimore, MD: Paul H. Brookes Publishing; 1999.
136. Zeitlin M. Nutritional resilience in a hostile environment: Positive deviance in child nutrition. *Nutr Rev*. 1991;49:259-268.
137. Darbyshire P. Infant feeding: Fussy eaters. *Nurs Times*. 1987; 83:57-58.
138. Daws D. Perils of Intimacy. *J Child Psychother*. 1997;23:179-199.
139. Daws D. Family relationships and infant feeding problems. *Health Visitor*. 1994;67:162-164.
140. Finney JW. Preventing common feeding problems in infants and young children. *Pediatr Clin North Am*. 1986;33:775-788.
141. Goldberg S. Social competence in infancy: A model of parent-infant interaction. *Merrill-Palmer Q*. 1977;23:163-177.
142. Margiotta P. Infant feeding: The food of love. *Community Outlook*. 1989;Feb 8:6-11.
143. McBean L, Miller G. Enhancing nutrition of America's youth. *J Am Coll Nutr*. 1999;18:563-571.
144. Mogan J. Prevention of childhood obesity. *Issues Compr Pediatr Nurs*. 1986;9:33-38.
145. Nutt HH. Infant nutrition and obesity. *Nurs Forum*. 1979;18: 131-156.
146. Romeo S. Transitioning to table foods: The parent offers and the child eats . . . sometimes. *Adv Nurse Pract*. 2001;9:63-68.
147. Satter E. Feeding dynamics: Helping children to eat well. *J Pediatr Health Care*. 1995;9: 178-184.
148. Chamberlin LA, Sherman SN, Jain A, Powers SW, Whitaker RC. The challenge of preventing and treating obesity in low-income, preschool children: Perceptions of WIC health care professionals. *Arch Pediatr Adolesc Med*. 2002;662-668.
149. Wright P. Learning experiences in feeding behavior during infancy. *J Psychosom Res*. 1988; 32:613-619.
150. Livingstone B. Healthy eating in infancy. *Professional Care of Mother and Child*. 1997;7:9-11.
151. Schmitt B. Infants who do not sleep through the night. *J Dev Behav Pediatr*. 1981;2:20-23.
152. Mennella J, Beauchamp G. Mothers' milk enhances the acceptance of cereal during weaning. *Pediatr Res*. 1997;41:188-192.
153. Sullivan SA, Birch LL. Infant dietary acceptance of solid foods. *Pediatrics*. 1994;93:271-277.
154. Owles EW, Hitchcock NE, Gracey M. Feeding patterns of Australian infants: Birth to one year. *Hum Nutr: Appl Nutr*. 1982;36: 202-207.
155. Coutts A. Nutrition and the life cycle 2: Infancy and weaning. *Br J Nurs*. 2000;9:2205-2216.
156. Rozee E. Concepts in infant nutrition. *The Canadian Nurse*. 1976;72:18-21.
157. Slattery JS. Nutrition for the normal healthy infant. *Am J Maternal Child Nurs*. 1977;2:105-112.
158. Hill AS, Bishop S, Malloy MH. Introduction of solid foods to African American and Anglo American low-birth-weight and full-term infants. *ABNF J*. 1995; 6:118-124.
159. Underwood BA, Hofvander Y. Appropriate timing for complementary feeding of the breast-fed infant: A review. *Acta Paediatr Scand*. 1982;294:1-32.
160. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding (Cochrane Review) In: The Cochrane Library, Issue 2, 2003.
161. Vahlquist B. Supplementary feeding of infants and young children. *Bibliotheca nutritio et dieta*. 1973;18:202-214.
162. Meer PA. Update on feeding babies solid food. *J Pediatr Health Care*. 1998;12:152-153.

163. McConahy KL, Smicklas-Wright H, Birch LL, Mitchell DC, Piccano MF. Food portions are positively related to energy intake and body weight in early childhood. *J Pediatr*. 2002;140:340-347.
164. Reau NR, Senturia YD, Lebailly SA, Kaufer K, Christoffel. Infant and Toddler Feeding Patterns and Problems: Normative Data and a New Direction. *Dev Behav Pediatr*. 1996;17:149-153.
165. Pearce C. Food intake and meal patterns of one year old infants. *Appetite*. 1997;29:201-212.
166. United States Department of Agriculture Food and Nutrition Service. FNS-305. Blocks for Fun and Healthy Meals. A Menu Planner for the Child and Adult Care Food Program. 2000. Available at: [http://www.fns.usda.gov/tn/Resources/building\\_blocks.html](http://www.fns.usda.gov/tn/Resources/building_blocks.html). Accessed November 21, 2003.
167. Skinner JD, Carruth BR, Bounds W, Ziegler P, Reidy K. Do food-related experiences in the first 2 years of life predict dietary variety in school-aged children? *J Nutr Educ and Behav*. 2002;34:310-315.
168. Skinner JD, Carruth BR, Bounds W, Ziegler P. Children's food preferences: A longitudinal analysis. *J Am Diet Assoc*. 2002;102:1638-1647.
169. Mennella JA, Beauchamp G. Flavor experiences during formula feeding are related to preferences during childhood. *Early Hum Dev*. 2002;68:71-82.
170. Gerrish CJ, Mennella JA. Flavor variety enhances food acceptance in formula-fed infants. *Am J Clin Nutr*. 2001;73:1080-1085.
171. Mennella J. Early flavor experiences: research update. *Nutr Rev*. 1998;56:205-211.
172. Birch LL. What kind of exposure reduces children's food neophobia? Looking vs. tasting. *Appetite*. 1987;9:283-289.
173. Birch LL, Gunder L, Grimm-Thomas K, Laing DG. Infants' consumption of a new food enhances acceptance of similar foods. *Appetite*. 1998;30:283-295.
174. Sullivan SA, Birch LL. Infant dietary experiences and acceptance of solid foods. *Pediatrics*. 1994;93:217-277.
175. Birch LL. Development of food acceptance patterns in the first years of life. *Proc Nutr Soc*. 1998;57:671-624.
176. Carruth BR, Skinner J, Houck K, Moran J III, Coletta F, Ott D. The phenomenon of "picky eater": A behavioral marker in eating patterns of toddlers. *J Am Col Nutr*. 1998;17:180-186.
177. Miller AM, Harwood RL. The cultural organization of parenting: Change and stability of behavior patterns during feeding and social play across the first year of life. *Parenting: Sci Pract*. 2002;2:241-272.
178. Schulze PA, Harwood RL, Schoelmerich A, Leyendecker B. The cultural structuring of parenting and universal developmental tasks. *Parenting: Sci Pract*. 2002;2:151-178.
179. Avery A, Baxter A. Change to cup: An audit to determine parental awareness and practices in changing from bottle to cup. *J Hum Nutr Diet*. 2001;14:217-223.
180. Birch LL, Fisher JA. Appetite and eating behavior in children. *Pediatr Clin North Am*. 1995;42:931-953.

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