

## Best Evidence Statement (BESt)

Date published/posted 9/25/2009

### Maternal Dietary Antigen Avoidance in Lactation

#### Clinical Question

- P (population/problem): In breastfeeding mothers  
I (intervention): are maternal diet modifications  
C (comparison): versus no maternal dietary modifications  
O (outcome): effective in the prevention or treatment of infant atopy, bloody stools, or colic?

#### Target Population

Breastfeeding mothers and their infants

**Recommendation(s)** (See Table of Recommendation Strength following references)

Diet recommendations related to the **PRIMARY PREVENTION** of atopic disease:

1. It is recommended that infants at high risk for developing atopic disease receive exclusive human milk feedings for at least the first four months of life (*Gdalevich 2001 [1a], Schoetzau 2002 [3a], Greer 2008 [5a], Zeiger 2003 [5a]*).
2. It is recommended that mothers not follow an elimination diet in pregnancy or during lactation as this has not been shown to prevent the development of atopic disease in children (*Kramer 2006 [1a], Palmer 2005 [2a], Vance 2004 [2b], Lovegrove 1994 [2b], Lilja 1991 [2b], Fleischer 2008 [5a], Greer 2008 [5a]*).

**Note:** A 2006 Cochrane review (*Kramer 2006 [1a]*) concluded that there was insufficient evidence that antigen avoidance during lactation was beneficial in preventing atopic disease in the breastfed infant, with the exception of atopic dermatitis. Due to methodologic shortcomings of the available published trials, more data are necessary to conclude that avoidance of antigens during lactation prevents atopic dermatitis in infants (*Greer 2008 [5a]*).

Diet recommendations related to the **TREATMENT** of infant atopy, bloody stools, or colic symptoms:

3. It is recommended that breastfeeding mothers receive dietary counseling to prevent nutritional deficiencies when they eliminate essential foods from their diet (*Kramer 2006 [1a], Fleischer 2008 [5a], Lifshitz 2008 [5a], Noimark 2008 [5a], Zeiger 2003 [5a]*).
4. There is insufficient evidence and a lack of consensus to make a recommendation on elimination diets for breastfeeding mothers of children with atopic eczema.

**Note:** One crossover trial (n=17) (*Cant 1986 [2b]*) found that dietary antigen avoidance by mothers of infants with atopic eczema was associated with a non-significant reduction in infant eczema severity scores.

5. It is recommended that the clinician consider a low allergen diet for breastfeeding mothers to reduce symptoms of colic in infants younger than six weeks (*Garrison 2000 [1a], Hill 2005 [2a], Hill 1995 [2b], Heine 2008 [5a]*).

**Note:** A low allergen maternal diet would begin with the elimination of milk and soy and progress to elimination of a greater variety of antigenic foods (eggs, wheat, peanuts, tree nuts, and fish) as

needed to decrease infant colic symptoms under the guidance of a Registered Dietitian. Colic is self-limiting and stepwise reintroduction of the eliminated foods should be attempted as soon as possible (Heine 2008 [5a]).

6. It is recommended that the clinician consider a trial low allergen maternal diet to manage breastfed infant symptoms of allergic colitis (Local Consensus [5], Lifschitz 2008 [5a], Lake 2000 [5a], Perisic 1988 [5a], Lake 1982 [5b]).

**Note:** A low allergen maternal diet would begin with complete elimination of cow's milk protein and progress to elimination of soy protein if symptoms persist. Resolution of bloody stools within 72 to 96 hours after elimination of the offending protein would be expected (Lake 2000 [5a]).

7. It is recommended that for infants with a confirmed food allergy, the causal food not be consumed by the breastfeeding mother (Noimark 2008 [5a], Zeiger 2003 [5a], Lifschitz 1988 [5a]).

### Discussion/summary of evidence

Breastfeeding may be protective against the development of atopy in infants with at least one first degree relative (parent or sibling) with documented allergic disease (Gdalevich 2001 [1a], Schoetzau 2002 [3a], Greer 2008 [5a], Zeiger 2003 [5a]). A systematic review by Gdalevich, Mimouni, David, and Mimouni (2001 [1a]) examined breastfeeding and the manifestations of skin atopy. The review and meta-analysis included 18 prospective studies meeting strict selection criteria in which the odds ratios (OR) of atopic dermatitis associated with breastfeeding were reported or could be estimated. A total of 4,158 participants were included in the trials. Mean follow-up time was 4.5 years. Exclusive breastfeeding was associated with a lower incidence of atopic dermatitis (OR 0.68,  $P < .0001$ ) and the protective effect was more pronounced in children with a family history of atopy (OR 0.58). The authors discuss the inconsistency in findings among many studies of the relationship between breastfeeding and atopic disease including study methodology and their attempt to cope with problems of suboptimal study quality. The substantial protective effect of breastfeeding against atopic dermatitis in children with a family history of atopy led to a strong recommendation to encourage mothers to breastfeed as a possible means of alleviating or preventing atopic dermatitis. This recommendation was supported by another prospective randomized cohort study (Schoetzau 2002 [3a]) in which exclusive breastfeeding in the first 16 weeks of life was found to decrease the risk of atopic dermatitis in the first year by nearly 50% compared to cow's milk feeding, OR 0.47 (95% CI 0.30; 0.74).

Elimination diets in pregnancy and lactation are not recommended for the prevention of atopic disease in children. A Cochrane Systematic Review of randomized controlled trials examined maternal dietary antigen avoidance during pregnancy and lactation for the prevention or treatment of atopic disease in children (Kramer 2006 [1a]). The authors concluded that prescription of an antigen avoidance diet to high risk women during lactation may reduce their child's risk of developing atopic eczema, but better trials are needed. Kramer and Kakuma also considered the possible adverse effect of an avoidance diet on the nutritional status of the fetus or mother. Maternal diet does affect maternal serum, cord blood, and milk antigen concentrations (Palmer 2005 [2a], Vance 2004 [2b], Lovegrove 1996 [2b], Lilja 1991 [2b]) but the effect on immune response in the infant is unclear. The evidence is insufficient to confer that maternal dietary antigen avoidance is beneficial or harmful.

Larger trials are needed before dietary recommendations during lactation can be made for patients with established atopic disease. In one study, breastfed infants with established atopic eczema experienced improvement in the severity of eczema symptoms when their mothers followed a low allergen diet free of cow milk, egg, chocolate, wheat, nuts, fish, beef, chicken, citrus fruits, colorings, and preservatives (Cant 1986 [2b]). In another small study, infants of atopic mothers seemed to benefit when dairy was eliminated from the maternal diet (Lovegrove 1994 [2b]). Larger trials are needed to determine the effect of maternal diet during lactation on symptoms of atopy. Mothers who are already following restricted diets because of their family

history should be given information and support to avoid nutritional deficiencies if they choose to restrict their diets (Fleischer 2008 [5a]).

A low allergen maternal diet may reduce symptoms of colic in breastfed infants (Garrison 2000 [1a], Hill 2005 [2a], Hill 1995 [2b]). One small trial with the elimination of cow's milk alone showed no effect on symptoms of colic (Evans 1981 [2b]), however, findings were significant in two separate trials which included maternal avoidance of a greater variety of antigenic foods including cow milk, eggs, peanuts, tree nuts, wheat, soy, and fish (Hill 2005 [2a], Hill 1995 [2b]). Infant distress scores and cry/fuss duration were reduced in breastfed infants whose mothers followed an antigen avoidance diet, absolute risk reduction (ARR) 37% (95% CI 18-56%;  $P < .001$ ) (Hill 2005 [2a]). Heine, 2008([5a]), notes that it can be difficult to eliminate the right range of foods without being overly restrictive. Maternal tolerance of a progressively restrictive elimination diet and the nutritional needs of both the mother and her infant can be closely monitored under the supervision of a dietitian to prevent adverse effects on health.

There are no controlled trials of maternal elimination diets for the management of inflammatory or allergic colitis in exclusively breastfed infants. According to Lake, 1982 ([5b]), "the role of proteins passed in human milk is suggested by the absence of other dietary protein intake, the exclusion of infectious causes, the resolution with introduction of alternative feedings, and the reinduction of disease after reinstatement of breast-feeding." Available case reports of allergic colitis with rectal bleeding suggest a possible role for maternal dietary elimination of cow's milk and soy in otherwise healthy, thriving breastfed infants (Perisic 1988 [5a], Lake 1982 [5b]).

Anaphylactic shock has been reported to occur in infants after exposure to antigens in breast milk (Lifschitz 1988 [5a]). Elimination of the protein from the diet of the breastfeeding mother led to improvement of food allergy symptoms (Noimark 2008 [5a], Zeiger 2003 [5a], Lifschitz 1988 [5a]). Authors consistently report that mothers of infants with a known food allergy must avoid that food in her diet while breastfeeding. It is recommended that all mothers avoiding essential foods in their diet receive appropriate dietary counseling to avoid nutritional deficiencies (Kramer 2006 [1a], Fleischer 2008 [5a], Lifschitz 2008 [5a], Noimark 2008 [5a], Zeiger 2003 [5a]).

## Health Benefits, Side Effects and Risks

A genetic basis for atopic diseases has been established, however environmental factors such as diet may have an important influence on their development and thus provide an opportunity to prevent or delay the onset of disease in infancy (Greer 2008 [5a]). In addition, the short and long-term maternal and infant health benefits of breastfeeding have been described (Ip 2007 [1a], Gartner 2005 [5a]). Individual dietary recommendations for the management of infant symptoms of atopy, bloody stools or colic should weigh the benefits and risks of human milk on infant and maternal health outcomes for each dyad.

## References/citations

1. **Cant, A. J.; Bailes, J. A.; Marsden, R. A.; and Hewitt, D.:** Effect of maternal dietary exclusion on breast fed infants with eczema: two controlled studies. *British Medical Journal (Clinical Research Ed.)*, 293(6541): 231-3, 1986, [2b] \_\_\_\_\_
2. **Evans, R. W.; Fergusson, D. M.; Allardyce, R. A.; and Taylor, B.:** Maternal diet and infantile colic in breast-fed infants. *Lancet*, 1(8234): 1340-2, 1981, [2b] \_\_\_\_\_
3. **Fleischer, D. M.:** Primary prevention of allergic disease: Maternal avoidance diets in pregnancy and lactation, 2008. Accessed 5/18/09 from [www.uptodate.com](http://www.uptodate.com) [5a].
4. **Garrison, M. M., and Christakis, D. A.:** A systematic review of treatments for infant colic. *Pediatrics*, 106(1 Pt 2): 184-90, 2000, [1a] \_\_\_\_\_
5. **Gartner, L. M.; Morton, J.; Lawrence, R. A.; Naylor, A. J.; O'Hare, D.; Schanler, R. J.; and Eidelman, A. I.:** Breastfeeding and the use of human milk. *Pediatrics*, 115(2): 496-506, 2005, [5a] \_\_\_\_\_

6. **Gdalevich, M.; Mimouni, D.; David, M.; and Mimouni, M.:** Breast-feeding and the onset of atopic dermatitis in childhood: a systematic review and meta-analysis of prospective studies. *Journal of the American Academy of Dermatology*, 45(4): 520-7, 2001, [1a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
7. **Greer, F. R.; Sicherer, S. H.; and Burks, A. W.:** Effects of early nutritional interventions on the development of atopic disease in infants and children: the role of maternal dietary restriction, breastfeeding, timing of introduction of complementary foods, and hydrolyzed formulas. *Pediatrics*, 121(1): 183-91, 2008, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
8. **Heine, R. G.:** Allergic gastrointestinal motility disorders in infancy and early childhood. *Pediatr Allergy Immunol*, 19(5): 383-91, 2008, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
9. **Hill, D. J.; Hudson, I. L.; Sheffield, L. J.; Shelton, M. J.; Menahem, S.; and Hosking, C. S.:** A low allergen diet is a significant intervention in infantile colic: results of a community-based study. *Journal of Allergy & Clinical Immunology*, 96(6 Pt 1): 886-92, 1995, [2b] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
10. **Hill, D. J.; Roy, N.; Heine, R. G.; Hosking, C. S.; Francis, D. E.; Brown, J.; Speirs, B.; Sadowsky, J.; and Carlin, J. B.:** Effect of a low-allergen maternal diet on colic among breastfed infants: a randomized, controlled trial. *Pediatrics*, 116(5): e709-15, 2005, [2a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
11. **Ip, S.; Chung, M.; Raman, G.; Chew, P.; Magula, N.; DeVine, D.; Trikalinos, T.; and Lau, J.:** Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Rep Technol Assess (Full Rep)*, (153): 1-186, 2007, [1a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
12. **Kramer, M. S., and Kakuma, R.:** Maternal dietary antigen avoidance during pregnancy or lactation, or both, for preventing or treating atopic disease in the child. *Cochrane Database of Systematic Reviews*, 3: CD000133, 2006, [1a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
13. **Lake, A. M.:** Food-induced eosinophilic proctocolitis. *Journal of Pediatric Gastroenterology & Nutrition*, 30 Supplement: S58-60, 2000, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
14. **Lake, A. M.; Whittington, P. F.; and Hamilton, S. R.:** Dietary protein-induced colitis in breast-fed infants. *Journal of Pediatrics*, 101(6): 906-10, 1982, [5b] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
15. **Lifschitz, C. H.:** Dietary protein-induced proctitis/colitis, enteropathy, and enterocolitis of infancy, 2008. Accessed 5/18/09 from [www.uptodate.com](http://www.uptodate.com)  [5a].
16. **Lifschitz, C. H.; Hawkins, H. K.; Guerra, C.; and Byrd, N.:** Anaphylactic shock due to cow's milk protein hypersensitivity in a breast-fed infant. *Journal of Pediatric Gastroenterology & Nutrition*, 7(1): 141-4, 1988, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
17. **Lilja, G.; Danaeus, A.; Foucard, T.; Graff-Lonnevig, V.; Johansson, S. G.; and Oman, H.:** Effects of maternal diet during late pregnancy and lactation on the development of IgE and egg- and milk-specific IgE and IgG antibodies in infants. *Clinical and Experimental Allergy*, 21(2): 195-202, 1991, [2b] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
18. **Local Consensus:** During recommendation development timeframe [5]  .
19. **Lovegrove, J. A.; Hampton, S. M.; and Morgan, J. B.:** The immunological and long-term atopic outcome of infants born to women following a milk-free diet during late pregnancy and lactation: a pilot study. *British Journal of Nutrition*, 71(2): 223-38, 1994, [2b] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
20. **Lovegrove, J. A.; Morgan, J. B.; and Hampton, S. M.:** Dietary factors influencing levels of food antibodies and antigens in breast milk. *Acta Paediatrica (Oslo)*, 85(7): 778-84, 1996, [2b] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
21. **Noimark, L.; Cox, H. E.; Noimark, L.; and Cox, H. E.:** Nutritional problems related to food allergy in childhood. *Pediatric Allergy & Immunology*, 19(2): 188-95, 2008, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
22. **Palmer, D. J.; Gold, M. S.; and Makrides, M.:** Effect of cooked and raw egg consumption on ovalbumin content of human milk: a randomized, double-blind, cross-over trial. *Clinical and Experimental Allergy*, 35(2): 173-8, 2005, [2a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
23. **Perisic, V. N.; Filipovic, D.; and Kokai, G.:** Allergic colitis with rectal bleeding in an exclusively breast-fed neonate. *Acta Paediatr Scand*, 77(1): 163-4, 1988, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
24. **Schoetzau, A. et al.:** Effect of exclusive breast-feeding and early solid food avoidance on the incidence of atopic dermatitis in high-risk infants at 1 year of age. *Pediatric Allergy and Immunology*, 13(4): 234-42, 2002, [3a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
25. **Vance, G. H.; Grimshaw, K. E.; Briggs, R.; Lewis, S. A.; Mullee, M. A.; Thornton, C. A.; and Warner, J. O.:** Serum ovalbumin-specific immunoglobulin G responses during pregnancy reflect maternal intake of dietary egg and relate to the development of allergy in early infancy. *Clinical and Experimental Allergy*, 34(12): 1855-61, 2004, [2b] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).
26. **Zeiger, R. S.:** Food allergen avoidance in the prevention of food allergy in infants and children. *Pediatrics*, 111(6 Pt 3): 1662-71, 2003, [5a] [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#).

Note: Full tables of evidence grading system available in separate document:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (abbreviated table below)

**Table of Evidence Levels** (see note above)

<i>Quality level</i>	<i>Definition</i>
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

**Table of Recommendation Strength** (see note above)

<i>Strength</i>	<i>Definition</i>
“Strongly recommended”	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
“Recommended”	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.

**Dimensions:** In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.

1. Grade of the Body of Evidence (see note above)
2. Safety / Harm
3. Health benefit to patient (*direct benefit*)
4. Burden to patient of adherence to recommendation (*cost, hassle, discomfort, pain, motivation, ability to adhere, time*)
5. Cost-effectiveness to healthcare system (*balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis*)
6. Directness (*the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]*)
7. Impact on morbidity/mortality or quality of life

---

## Supporting information

### Group/team members

*Group/Team Leader:*

*Betsy List, MPH, RN, IBCLC, Health Policy & Clinical Effectiveness*

*Other group/team members:*

*Amal Assa’ad, MD, Division of Allergy & Immunology*

*Michael Farrell, MD, Chief of Staff*

*Mandy Monty RD, LD, Division of Nutrition Therapy*

*Sarah Riddle, MD, IBCLC, Division of General & Community Pediatrics*

*Terri Rutz, BSN, RN, IBCLC, Division of Nutrition Therapy*

*Support personnel:*

*Eloise Clark, MPH, MBA, Health Policy & Clinical Effectiveness*

## Search strategy

1. OVID EBM Reviews (Cochrane)
  - Limit set for English language
  - Keywords: maternal diet and lactation
2. PUBMED Medline
  - Limits set for English language, 2004 to present
  - Medical Subject Headings (MeSH): Allergens [\*administration & dosage]; Dietary Proteins [\*administration & dosage]; Hypersensitivity, Immediate [\*prevention & control]; Infant, Newborn; Lactation; Randomized Controlled Trials as Topic; Risk Factors
3. CINAHL
  - Limits set for English language, Exclude Medline records
  - Search terms: maternal diet and lactation
4. Online search for practice guidelines: AHRQ, TRIP, Medscape, Netting the Evidence, Joanna Briggs, UpToDate
5. Additional articles identified from reference lists of retrieved articles and guidelines

Copies of this Best Evidence Statement (BESt) are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm>  
Examples of approved uses of the BESt include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BESt may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at [HPCEInfo@cchmc.org](mailto:HPCEInfo@cchmc.org) for any BESt adopted, adapted, implemented or hyperlinked by the organization is appreciated.

*Additionally for more information about CCHMC Best Evidence Statements and the development process, contact the Health Policy & Clinical Effectiveness office at: 513-636-2501 or [HPCEInfo@chmcc.org](mailto:HPCEInfo@chmcc.org).*

## Note

**This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.**

**Reviewed by** Clinical Effectiveness