



Donor Human Milk for the High-Risk Infant: Preparation, Safety, and Usage Options in the United States

COMMITTEE ON NUTRITION, SECTION ON BREASTFEEDING, COMMITTEE ON FETUS AND NEWBORN

The use of donor human milk is increasing for high-risk infants, primarily for infants born weighing <1500 g or those who have severe intestinal disorders. Pasteurized donor milk may be considered in situations in which the supply of maternal milk is insufficient. The use of pasteurized donor milk is safe when appropriate measures are used to screen donors and collect, store, and pasteurize the milk and then distribute it through established human milk banks. The use of nonpasteurized donor milk and other forms of direct, Internet-based, or informal human milk sharing does not involve this level of safety and is not recommended. It is important that health care providers counsel families considering milk sharing about the risks of bacterial or viral contamination of nonpasteurized human milk and about the possibilities of exposure to medications, drugs, or herbs in human milk. Currently, the use of pasteurized donor milk is limited by its availability and affordability. The development of public policy to improve and expand access to pasteurized donor milk, including policies that support improved governmental and private financial support for donor milk banks and the use of donor milk, is important.

INTRODUCTION

Human milk provides health benefits for all newborn infants but is of particular importance for high-risk infants, especially those born with very low birth weight (<1500 g). Donor human milk also can be beneficial to supplement the mother's own milk when necessary. The evidence to support the use of donor human milk has been reviewed,¹⁻⁶ and recent studies⁷⁻⁹ support health benefits for its use in infants with a birth weight <1500 g, especially in decreasing rates of necrotizing enterocolitis.

Donor milk banks represent a safe and effective approach to obtaining, pasteurizing, and dispensing human milk for use in NICUs and other settings. However, accessibility to donor milk in the United States

abstract

FREE

This document is copyrighted and is property of the American Academy of Pediatrics and its Board of Directors. All authors have filed conflict of interest statements with the American Academy of Pediatrics. Any conflicts have been resolved through a process approved by the Board of Directors. The American Academy of Pediatrics has neither solicited nor accepted any commercial involvement in the development of the content of this publication.

Policy statements from the American Academy of Pediatrics benefit from expertise and resources of liaisons and internal (AAP) and external reviewers. However, policy statements from the American Academy of Pediatrics may not reflect the views of the liaisons or the organizations or government agencies that they represent.

The guidance in this statement does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

DOI: 10.1542/peds.2016-3440

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2017 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The authors have indicated they do not have a financial relationship relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

To cite: AAP COMMITTEE ON NUTRITION, AAP SECTION ON BREASTFEEDING, AAP COMMITTEE ON FETUS AND NEWBORN. Donor Human Milk for the High-Risk Infant: Preparation, Safety, and Usage Options in the United States. *Pediatrics*. 2017;139(1):e20163440

continues to be substantially limited in terms of supply, cost, and distribution. Because of these limitations, some parents have chosen to exchange human milk that is not pasteurized or handled by an established milk bank with each other (milk sharing). This report reviews the preparation, safety, and usage options for donor human milk in the United States.

PREPARATION OF DONOR HUMAN MILK, PASTEURIZATION, AND DISTRIBUTION

The number of human milk banks in the United States is increasing. Currently, there are 20 donor milk banks in the United States and 4 in Canada that pasteurize milk as part of a professional organization for supporters of nonprofit human milk banking, the Human Milk Banking Association of North America (HMBANA); 7 others are in various stages of planning and development (www.hmbana.org). In addition, several commercial (for-profit) human milk banks collect, pasteurize, and distribute donor human milk but are not part of HMBANA.

Donor Human Milk Collection

HMBANA has established policies for donor human milk collection, as do commercial human milk banks.¹⁰ These have been described in the literature^{1,2} and in the policies usually found on the Web sites of the individual milk banks. Guidelines for donors include completion of a health screen, blood serologic testing, and detailed instructions on collecting, storing, and shipping milk.¹⁰ In contrast, direct milk sharing or other forms of milk collection and distribution are extremely variable in the screening of donors and the methods of milk storage and transportation.

Pasteurization

Several methods may be used to pasteurize donor human milk,

and these have been reviewed extensively.^{1,3,11} The Holder pasteurization method uses heating at 62.5°C for 30 minutes and is the primary method used by HMBANA milk banks. One commercial milk bank, Medolac Laboratories (Lake Oswego, OR), uses a different thermal pasteurization system.

Distribution

In the United States and Canada, most donor milk is distributed by established milk banks to NICUs. Each milk bank and/or processing center has policies, including cost-related guidelines, for this distribution. The distribution of donor milk may be subject to federal or state guidelines in some situations, but at the time of this publication, there are no restrictions on the use of pasteurized donor human milk in any state in the United States.

Frozen donor human milk is distributed by using shipping guidelines established by the milk banks. Receiving hospitals are provided guidance related to temperature and other storage conditions for the milk, and these may be subject to state and local regulations. Hospitals that use frozen donor human milk must have properly regulated freezers and other methods for handling and tracking donor milk.

SAFETY

Human milk is a biological product; therefore, whether from an infant's own mother or a donor mother, there will always be concerns about contamination. Possible contaminants are infectious agents, including both bacteria and viruses, and contamination with other substances, most notably toxic components in the environment (eg, pesticides, mercury, medications, drugs, or herbs).

Although a detailed description of each of these is beyond the scope of

this statement, the processes used in pasteurization of donor human milk are highly effective in removing viral infectious contaminants.¹⁰⁻¹⁴ Human milk banks vary in their approach to bacterial screening of incoming milk, but postpasteurization bacteriologic cultures are performed routinely. Published data^{10,11} have revealed a very low or unmeasurable level of infectious contaminants. Families and caregivers may be reassured that, at the time of this publication, there are no reported cases of pasteurized donor human milk causing an infection with hepatitis viruses or HIV and that the likelihood of this type of infection occurring in a neonate given donor human milk is extremely small.

With regard to noninfectious contaminants, although these can be difficult to completely eliminate, the pooling process with donor milk makes it very unlikely that these will represent a significant exposure risk. An exception to this is cow milk protein, which is present in the milk of mothers who include dairy in their diet. The contamination of human milk purchased via the Internet with cow milk (up to a 10% dilution of the human milk) has recently been reported.¹⁵

In contrast, informal direct milk sharing without pasteurization exposes infants to a range of possible risks, including bacterial contamination¹⁶ and viral transmission, including cytomegalovirus, hepatitis viruses, and HIV.¹⁷ Individual screening is performed by some Internet-based groups that organize direct milk sharing, but these are neither consistently applied nor documented. Furthermore, even with serologic blood testing, infectious complications remain a significant risk in unpasteurized milk.

Because direct milk sharing is often arranged by using milk from a single donor mother, other contaminants, such as medications or drugs, may be

a higher risk than with pooled milk products. It is unknown what effects paying women for milk might have on these risks.

Growth Issues

Early studies in the use of donor human milk for small preterm infants showed relatively slow growth. More recent studies¹⁸⁻²⁰ showed improved growth outcomes, which may be attributable both to a greater availability of donor milk with higher nutrient content and to widely used strategies for fortifying donor milk. However, these are retrospective cohort studies, and further studies are needed. Strategies for fortifying donor human milk include both commercial human milk-based and cow milk protein-based fortifiers. Both types of fortifiers have been shown to lead to appropriate growth, and the use of donor human milk does not need to be limited on the basis of growth concerns in most high-risk infants. Growth monitoring is always paramount for infants, and human milk fortification is needed for all infants with very low birth weight.

Loss of Nutrients and Antiinflammatory Properties

The process of pasteurization destroys cells, such as neutrophils and stem cells, and affects macronutrients and antiinflammatory factors. In addition, pasteurization can eliminate bacterial strains with probiotic properties. Substantial evidence describing these losses is available.²¹⁻²⁵ Bioactive components of human milk, including lactoferrin and immunoglobulins, are substantially decreased by pasteurization, but there is much less effect on macro- or micronutrients, including vitamins.^{22,23} Overall, the benefits of improved feeding tolerance and clinical outcomes support the concept that some nutrient losses of bioactive components should not limit the use of donor human milk or preclude

its pasteurization before use. Donor human milk may have a lower protein and energy content than the milk of mothers of preterm infants, in addition to lost bile salt-dependent lipase activity, which may affect fortification strategies and growth. Alternative sterilization methods to preserve innate bioactive properties and to decrease the cost of preparing donor milk need investigation.

The principal goal for infants with very low birth weight is the provision of the mother's own milk, with donor human milk as a bridge or support while the mother's milk is made available or increasing in volume. It is important to encourage and assist mothers to pump or express and provide their own milk whenever possible and at the maximum volume possible. Although the use of donor human milk has not been shown to decrease the frequency or volume of mother's own milk to NICU patients,^{9,23,26,27} vigilance and education are needed regarding the superiority of mother's own milk relative to donor human milk.

USAGE

Infants <1500 g Birth Weight

The supply of donor human milk currently available in the United States and Canada is less than optimal. Although a goal of providing donor milk to supplement the mother's milk for all preterm infants has been described,⁵ this goal may not be achievable for a period of time; thus, prioritization may be needed for infants weighing <1500 g. Relatively few data are available on whether this would include small for gestational age infants, such as those who are >32 to 33 weeks' postmenstrual age at birth who also weigh <1500 g; but, in general, the primary guide for use is birth weight, not gestational age, in prioritizing donor milk use.

There are no clear guidelines for discontinuing the use of donor human milk in an infant <1500 g birth weight when the volume of mother's milk is not adequate. A range of postmenstrual ages from 32 to 36 weeks is commonly used in the United States, because this range covers the highest risk period for necrotizing enterocolitis. Further research is needed to clarify the optimal timing of discontinuing donor human milk. Breastfeeding should be encouraged during hospitalization for these infants to enhance the likelihood of successful breastfeeding after hospital discharge.²⁸

Other Intestinal Diseases

Fewer data are available regarding the use of donor human milk in other high-risk infants, including infants with abdominal wall defects, such as gastroschisis or omphalocele, and other conditions, such as congenital heart disease. Nonetheless, some infants with these conditions or other neonatal disorders may benefit from donor human milk either because of a direct effect on intestinal growth or improved feeding tolerance.²⁹ In these cases, payers may expect documentation of intolerance to specialized infant formulas and the medical necessity for donor human milk before providing payment for human milk at home or in the hospital.

Outpatient (Home) Versus Hospital Distribution

The vast majority of donor human milk distributed from HMBANA milk banks is distributed to hospitals for internal use in NICU patients. However, in some cases, donor human milk may be provided for home use from HMBANA milk banks.¹ In cases of limited supply, health care providers, such as community pediatricians and neonatologists, can work together to establish priority for such use relative to local NICU needs. A pediatrician/

neonatal clinician generally will need to be involved in ordering and supervising the use of donor milk in any outpatient setting. Clear documentation as to the reason for the use of donor human milk at home is recommended.

OTHER POLICY ISSUES

Cost Reimbursement

A major limitation in the use of donor human milk is the cost of providing this milk to hospitals or to families. Reimbursement for donor milk is inconsistent between states and often between sources of payment. Health care providers can advocate for the development of public and local hospital policies to enhance the availability and affordability of donor human milk on the basis of evidence. Resources from the American Academy of Pediatrics and other groups can also assist those involved in the care of neonates in this discussion.

The use of donor human milk in appropriate high-risk infants is consistent with good health care for these infants.^{30,31} Policies are needed to provide high-risk infants access to donor human milk on the basis of documented medical necessity, not financial status.

Federal and State Regulation of Milk Banks and Donor Milk Sharing

Legal issues exist regarding the regulation of donor human milk banks on both a state and national level. Federal or state guidelines are needed regarding the preparation, handling, and transfer of human milk as well as the operation of donor human milk banks and would be best accomplished via formal regulation by the US Food and Drug Administration with oversight by the Centers for Disease Control and Prevention.

Families of high-risk infants should be fully informed about the current

state of research regarding the benefits of using human milk to decrease the risks of complications such as necrotizing enterocolitis. This discussion may include appropriate warnings about risks related to infectious complications when human milk is shared or distributed outside of established milk banks. Neonatologists and other health care providers should advocate for policies of full disclosure of the risks and benefits related to direct or informal milk sharing without pasteurization. Hospitals should develop standards such that all human milk given to infants meets appropriate standards for preparation and distribution and that pasteurization of all donor human milk occurs.

SUMMARY OF KEY POINTS

1. Although a mother's own milk is always preferred, donor human milk may be used for high-risk infants when the mother's milk is not available or the mother cannot provide milk. Priority should be given to providing donor human milk to infants <1500 g birth weight.
2. Human milk donors should be identified and screened by using methods such as those currently used by HMBANA milk banks or other established commercial milk banks.
3. Donor milk should be pasteurized according to accepted standards. Postpasteurization testing should be performed according to internal quality-control guidelines.
4. Health care providers should discourage families from direct human milk sharing or purchasing human milk from the Internet because of the increased risks of bacterial or viral contamination of nonpasteurized milk and the possibility of exposure to medications, drugs, or other

substances, including cow milk protein.

5. The use of donor human milk in appropriate high-risk infants should not be limited by an individual's ability to pay. Policies are needed to provide high-risk infants access to donor human milk on the basis of documented medical necessity, not financial status.

LEAD AUTHORS

Steven A. Abrams, MD, FAAP
Susan Landers, MD, FAAP
Lawrence M. Noble, MD, FAAP
Brenda B. Poindexter, MD, FAAP

COMMITTEE ON NUTRITION, 2015–2016

Stephen Daniels, MD, PhD, FAAP, Chairperson
Mark Corkins, MD, FAAP
Sarah de Ferranti, MD, FAAP
Neville H. Golden, MD, FAAP
Jae H. Kim, MD, PhD, FAAP
Sheela N. Magge, MD, MSCE, FAAP
Sarah Jane Schwarzenberg, MD, FAAP

LIAISONS

Carrie L. Assar, PharmD, MS – *Food and Drug Administration*
Jeff Critch, MD – *Canadian Pediatric Society*
Van Hubbard, MD, PhD – *National Institutes of Health*
Kelley Scanlon, PhD – *Centers for Disease Control and Prevention*
Valery Soto, MS, RD, LD – *US Department of Agriculture*

STAFF

Debra Burrowes, MHA

SECTION ON BREASTFEEDING EXECUTIVE COMMITTEE, 2015–2016

Joan Younger Meek, MD, MS, RD, FAAP, Chairperson
Margreete G. Johnston, MD, MPH, FAAP
Mary Ellen O'Connor, MD, MPH, FAAP
Lisa M. Stellwagen, MD, FAAP
Jennifer Peelen Thomas, MD, MPH, FAAP
Julie L. Ware, MD, FAAP
Richard J. Schanler, MD, FAAP, Immediate Past Chair

STAFF

Ngozi Onyema-Melton, MPH

COMMITTEE ON FETUS AND NEWBORN, 2015–2016

Kristi L. Watterberg, MD, FAAP, Chairperson
Susan Wright Aucott, MD, FAAP

William E. Benitz, MD, FAAP
James J. Cummings, MD, FAAP
Eric C. Eichenwald, MD, FAAP
Jay P. Goldsmith, MD, FAAP
Brenda B. Poindexter, MD, MS, FAAP
Karen M. Puopolo, MD, PhD, FAAP
Dan L. Stewart, MD, FAAP

LIAISONS

Erin L. Keels, APRN, MS, NNP – *National Association of Neonatal Nurses*
Thierry Lacaze, MD – *Canadian Pediatric Society*
Maria A. Mascola – *American College of Obstetricians and Gynecologists*
Tonse N.K. Raju, MD, FAAP – *National Institutes of Health*

STAFF

Jim R. Couto, MA

ABBREVIATION

HMBANA: Human Milk Banking Association of North America

REFERENCES

1. Landers S, Hartmann BT. Donor human milk banking and the emergence of milk sharing. *Pediatr Clin North Am*. 2013;60(1):247–260
2. Arslanoglu S, Ziegler EE, Moro GE; World Association of Perinatal Medicine Working Group on Nutrition. Donor human milk in preterm infant feeding: evidence and recommendations. *J Perinat Med*. 2010;38(4):347–351
3. Arslanoglu S, Corpeleijn W, Moro G, et al; ESPGHAN Committee on Nutrition. Donor human milk for preterm infants: current evidence and research directions. *J Pediatr Gastroenterol Nutr*. 2013;57(4):535–542
4. Bertino E, Giuliani F, Baricco M, et al. Benefits of donor milk in the feeding of preterm infants. *Early Hum Dev*. 2013;89(suppl 2):S3–S6
5. Quigley M, McGuire W. Formula versus donor breast milk for feeding preterm or low birth weight infants. *Cochrane Database Syst Rev*. 2014;4:CD002971
6. Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 2012;129(3). Available

at: www.pediatrics.org/cgi/content/full/129/3/e827

7. Sullivan S, Schanler RJ, Kim JH, et al. An exclusively human milk-based diet is associated with a lower rate of necrotizing enterocolitis than a diet of human milk and bovine milk-based products. *J Pediatr*. 2010;156(4):562–7.e1
8. Cristofalo EA, Schanler RJ, Blanco CL, et al. Randomized trial of exclusive human milk versus preterm formula diets in extremely premature infants. *J Pediatr*. 2013;163(6):1592–1595, e1
9. Kantorowska A, Wei JC, Cohen RS, Lawrence RA, Gould JB, Lee HC. Impact of donor milk availability on breast milk use and necrotizing enterocolitis rates. *Pediatrics*. 2016;137(3):e20153123
10. Human Milk Banking Association of North America. *Guidelines for Establishment and Operation of a Donor Human Milk Bank*. 16th ed. Fort Worth, TX: Human Milk Banking Association of North America; 2011
11. Czank C, Prime DK, Hartmann B, Simmer K, Hartmann PE. Retention of the immunological proteins of pasteurized human milk in relation to pasteurizer design and practice. *Pediatr Res*. 2009;66(4):374–379
12. Landers S, Updegrove K. Bacteriological screening of donor human milk before and after Holder pasteurization. *Breastfeed Med*. 2010;5(3):117–121
13. Terpstra FG, Rechtman DJ, Lee ML, et al. Antimicrobial and antiviral effect of high-temperature short-time (HTST) pasteurization applied to human milk. *Breastfeed Med*. 2007;2(1):27–33
14. de Segura AG, Escuder D, Montilla A, et al. Heating-induced bacteriological and biochemical modifications in human donor milk after holder pasteurisation. *J Pediatr Gastroenterol Nutr*. 2012;54(2):197–203
15. Keim SA, Kulkarni MM, McNamara K, et al. Cow's milk contamination of human milk purchased via the Internet. *Pediatrics*. 2015;135(5). Available at: www.pediatrics.org/cgi/content/full/135/5/e1157
16. Keim SA, Hogan JS, McNamara KA, et al. Microbial contamination of human milk purchased via the Internet. *Pediatrics*. 2013;132(5). Available at: www.pediatrics.org/cgi/content/full/132/5/e1227
17. Lindemann PC, Foshaugen I, Lindemann R. Characteristics of breast milk and serology of women donating breast milk to a milk bank. *Arch Dis Child Fetal Neonatal Ed*. 2004;89(5):F440–F441
18. Colaizy TT, Carlson S, Saftlas AF, Morriss FH Jr. Growth in VLBW infants fed predominantly fortified maternal and donor human milk diets: a retrospective cohort study. *BMC Pediatr*. 2012;12:124–133
19. Rochow N, Fusch G, Choi A, et al. Target fortification of breast milk with fat, protein, and carbohydrates for preterm infants. *J Pediatr*. 2013;163(4):1001–1007
20. Hair AB, Hawthorne KM, Chetta KE, Abrams SA. Human milk feeding supports adequate growth in infants \leq 1250 grams birth weight. *BMC Res Notes*. 2013;6:459–467
21. García-Lara NR, Vieco DE, De la Cruz-Bértolo J, Lora-Pablos D, Velasco NU, Pallás-Alonso CR. Effect of Holder pasteurization and frozen storage on macronutrients and energy content of breast milk. *J Pediatr Gastroenterol Nutr*. 2013;57(3):377–382
22. García-Lara NR, Escuder-Vieco D, García-Algar O, De la Cruz J, Lora D, Pallás-Alonso C. Effect of freezing time on macronutrients and energy content of breastmilk. *Breastfeed Med*. 2012;7(4):295–301
23. Silvestre D, Miranda M, Muriach M, Almansa I, Jareño E, Romero FJ. Antioxidant capacity of human milk: effect of thermal conditions for the pasteurization. *Acta Paediatr*. 2008;97(8):1070–1074
24. Wada Y, Lönnerdal B. Bioactive peptides released from in vitro digestion of human milk with or without pasteurization. *Pediatr Res*. 2015;77(4):546–553
25. Coscia A, Peila C, Bertino E, et al. Effect of Holder pasteurisation on human milk glycosaminoglycans. *J Pediatr Gastroenterol Nutr*. 2015;60(1):127–130
26. Delfosse NM, Ward L, Lagomarcino AJ, et al. Donor human milk largely

- replaces formula-feeding of preterm infants in two urban hospitals. *J Perinatol.* 2013;33(6):446–451
27. Arslanoglu S, Moro GE, Bellù R, et al. Presence of human milk bank is associated with elevated rate of exclusive breastfeeding in VLBW infants. *J Perinat Med.* 2013;41(2):129–131
28. Meier PP, Engstrom JL, Patel AL, Jegier BJ, Bruns NE. Improving the use of human milk during and after the NICU stay. *Clin Perinatol.* 2010;37(1):217–245
29. Kohler JA Sr, Perkins AM, Bass WT. Human milk versus formula after gastroschisis repair: effects on time to full feeds and time to discharge. *J Perinatol.* 2013;33(8):627–630
30. Parker MG, Barrero-Castillero A, Corwin BK, Kavanagh PL, Belfort MB, Wang CJ. Pasteurized human donor milk use among US level 3 neonatal intensive care units. *J Hum Lact.* 2013;29(3):381–389
31. Perrine CG, Scanlon KS. Prevalence of use of human milk in US advanced care neonatal units. *Pediatrics.* 2013;131(6):1066–1071

**Donor Human Milk for the High-Risk Infant: Preparation, Safety, and Usage
Options in the United States**

COMMITTEE ON NUTRITION, SECTION ON BREASTFEEDING and
COMMITTEE ON FETUS AND NEWBORN

Pediatrics; originally published online December 19, 2016;

DOI: 10.1542/peds.2016-3440

Updated Information & Services	including high resolution figures, can be found at: /content/early/2016/12/15/peds.2016-3440.full.html
References	This article cites 30 articles, 7 of which can be accessed free at: /content/early/2016/12/15/peds.2016-3440.full.html#ref-list-1
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Nutrition /cgi/collection/nutrition_sub Breastfeeding /cgi/collection/breastfeeding_sub
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: /site/misc/Permissions.xhtml
Reprints	Information about ordering reprints can be found online: /site/misc/reprints.xhtml

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2016 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Donor Human Milk for the High-Risk Infant: Preparation, Safety, and Usage Options in the United States

COMMITTEE ON NUTRITION, SECTION ON BREASTFEEDING and
COMMITTEE ON FETUS AND NEWBORN

Pediatrics; originally published online December 19, 2016;

DOI: 10.1542/peds.2016-3440

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

[/content/early/2016/12/15/peds.2016-3440.full.html](http://content.early/2016/12/15/peds.2016-3440.full.html)

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2016 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

