

Donor Human Milk for Preterm Infants



What It Is, What It Can Do, and What Still Needs to Be Learned

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KEYWORDS

- Donor human milk • VLBW infant • Necrotizing enterocolitis
- Neurodevelopmental outcomes

KEY POINTS

- Donor human milk is different from maternal milk, and although similar or equivalent benefits might be postulated, high-quality evidence for benefits of donor milk use in very low birth weight (VLBW) infants in the era of routine human milk fortification is sparse.
- There is a significant body of evidence that maternal human milk use results in superior outcomes in multiple domains (infection, neurodevelopment) compared with formula diets in VLBW infants.
- Donor milk is an appropriate choice for VLBW infants whose maternal milk is either insufficient in quantity or unavailable.

INTRODUCTION

Donor human milk is not a new idea, with wet-nursing being a common practice for all of recorded history. The Code of Hammurabi, written in 1770 BC, outlines punishment for wet-nurses whose charges die,¹ and Soranus laid out ideal attributes for wet nurses in first century AD Rome.² Milk banking began in France in the 1800s, with the first human milk bank formed in the United States in Boston, Massachusetts, in 1912. In 1934, the Dionne quintuplets were fed an estimated 237 L (8000 oz) of milk donated by women from Toronto, which was shipped to their rural Ontario home by train.³

As evidence of differences in outcomes of very low birth weight (VLBW) infants fed maternal human milk compared with those fed infant formula has mounted, donor human milk has become an increasingly used intervention when maternal milk is unavailable. Use of maternal milk during the birth hospitalization in VLBW infants has been

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associated with lessened in-hospital morbidity including lower rates of necrotizing enterocolitis (NEC),⁴⁻⁸ late-onset sepsis,^{4,5} bronchopulmonary dysplasia,^{4,9} the composite outcome of NEC or death,¹⁰ and severe retinopathy of prematurity.⁷ Maternal milk diets have also been associated with shorter hospital stays⁴ and lower incidence of rehospitalization⁹ than preterm formula diets. Most important for lifelong benefit, maternal milk intake in preterm infants has also been associated with superior neurodevelopmental outcomes compared with formula diets, measured at 18 to 22 months,⁹ 30 months,¹¹ and 7 to 8 years,¹² with demonstration of a significant dose-response relationship.^{9,12}

Donor human milk, dispensed as a pooled, pasteurized product from accredited milk banks, is used as a replacement for infant formula when maternal milk is insufficient or unavailable to the VLBW infant. Most donor human milk dispensed in the United States and Canada to preterm infants comes from the member banks of the Human Milk Banking Association of North America (HMBANA). Growth in milk banking in North America has been brisk over the past decade, with 6 banks dispensing in 2003 and 16 in 2013, with 3 more in the development phase. In 2011, the member banks of the HMBANA dispensed more than 64,470 L (2.18 million ounces) of donor milk, up from 32,530 L (1.1 million ounces) dispensed in 2007.¹³ Donor milk is also available commercially, from Prolacta Bioscience (Monrovia, CA).

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This article introduces donor human milk and describes the known biological differences between maternal milk and donor milk. Evidence for benefits of donor human milk for VLBW infants compared with term or preterm infant formula is explored.

DONOR MILK: AN INTRODUCTION

Donor human milk dispensed by milk banks is obtained in North America from volunteer donors, most of whom have given birth to healthy term infants. Donors may donate existing frozen stored milk, may express milk in an ongoing manner specifically for donation to the bank, or may use a combination of these donation strategies. Milk donors undergo a thorough screening process to assess for behavioral risk factors for blood-borne infection, and undergo serologic screening for all strains of human immunodeficiency virus (HIV), HTLV I and II (Human T-Lymphocytic Virus), hepatitis B and C, and syphilis. They may not be users of nicotine products or use alcohol daily in excess of 2 drinks. Few chronic medications are compatible with milk donation, with only low-dose oral contraceptives, insulin, thyroid hormone replacement, and selected selective serotonin reuptake inhibitors allowed. Medications taken for temporary periods require abstaining from milk donation for 5 times the half-life of the medication,¹⁴ and donors are instructed to refrain from expressing milk for donation within 12 hours following alcohol consumption.¹⁴

Donor Milk Processing

Donors express milk at home, using personally owned equipment. They are given instruction on clean technique for milk expression, including cleaning of pump parts, hand washing, appropriate storage containers, and handling of milk. Milk is stored frozen before delivery to the milk bank. At the bank, frozen milk from several donors is thawed gradually in refrigerators. It is pooled to equilibrate the nutritional content of the milk. Donor milk in North America is then pasteurized by one of 2 methods: Holder pasteurization or high-temperature short-time (HTST) pasteurization. Member

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