

## Mini Review

# Mother's Milk in the NICU

Barbara Krolak-Olejnik\* and Matylda Czosnykowska-Lukacka

Department of Neonatology, Medical University of Wrocław, Poland

## \*Corresponding author

Barbara Krolak-Olejnik, Department of Neonatology, Medical University of Wrocław, Wrocław, Poland, Email: olejnik.basia@gmail.com

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## Abstract

Human milk is the recommended nutritional source for full-term infants – exclusively for the first 6 months of postnatal life and in combination with complementary foods until the infant reaches 2 years of age. Policy statements from WHO, UNICEF and other international and national organizations confirm the importance of providing mother's own milk to pre-term and small for gestational age (SGA) infants. Standard practice in neonatal units is to promote mother's own milk as the feed of choice for all LBW infants. Human Milk Bank (HMB) provide an alternative to formula feeds for pre-term infants when mother's own milk is unavailable. HMB is a facility established with the purpose of selecting, collecting, checking, processing, storing, and distributing donor human milk, which is to be used for specific medical requirements. There is strong and consistent evidence that feeding mother's milk and also donor milk from HMB to pre-term infants is associated with lower risk of necrotizing enterocolitis (NEC), and late-onset sepsis (LOS) increasing with decreasing gestational age and birth weight.

## INTRODUCTION

Big progress in the fields of perinatal and neonatal medicine has resulted in improved survival of very low and extremely low-birth weight infants admitted to Neonatal Intensive Care Units (NICUs). One of challenging issues in NICU is appropriate nutrition. Nutrition for high risk pre-term infants is of fundamental importance influencing not only short-term health outcomes, but also long-term neuro developmental, metabolic outcomes. Human milk for appropriate growth and development of a newborn infant is invaluable and there are no doubts that human milk is the best nutrient for term infants and pre-term as well. Mother's own milk is the first choice for all neonates including preterm infants, when it is not available or not sufficient; donor human milk is a valid alternative [1]. Human milk is the recommended nutritional source for full-term infants – exclusively for the first 6 months of postnatal life and in combination with complementary foods until the infant reaches 2 years of age. Policy statements from WHO, UNICEF and other international and national organizations confirm the importance of providing mother's own milk to pre-term and SGA infants. Standard practice in neonatal units is to promote mother's own milk as the feed of choice for all LBW infants. When mother's own milk is unavailable, donor milk (DM) should be the second best alternative and although some nutritional elements are inactivated by the pasteurization process, it still has documented advantages compared to formula. "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) [2]. Some environmental

contaminants are found in human milk such as selected persistent organic pollutants including polychlorodibenzodioxins (PCDDs), polychlorodibenzofurans (PCDFs), polychlorobiphenyls (PCBs), organochlorinated pesticides (p,p'-DDE, p,p'-DDT, hexachlorobenzene), polybromodiphenyl ethers (PBDEs), and the heavy metals Cd, Co, Cu, Hg, Mn, Pb, Sn, and Zn. Despite the possibility of harm from environmental contaminants in breast milk, breastfeeding is still recommended as the best infant feeding method. It should be point out, that environmental contaminants are the problem, not mother's milk [3,4].

## PATIENTS IN NICU

Low birth weight (LBW) has been defined by the World Health Organization (WHO) as a weight at birth less than 2500 grams. There are sub-categories of preterm birth, based on gestational age extremely preterm before 28 weeks, very preterm from 28 to <32 weeks and moderate to late preterm (32 to <37 weeks) [5]. The global prevalence of LBW is 15.5%, which means that about 20.6 million such infants are born each year, 96.5% of them in developing countries [6]. Pre-term birth is a direct cause of 30% of the 4 million neonatal deaths that occur globally every year [7]. There are opportunities to reduce their infant mortality rates by improving the care of low birth weight infants. Feeding of pre-term neonates was one of the first interventions and was associated with reduced case fatality for pre-term babies in hospitals before the advent of intensive care [8]. Feeding strategies are critically important and can affect subsequent growth failure and long-term health. Preterm neonates have higher nutrient requirements than healthy appropriate-for-gestation term infants [9]. There is strong and consistent evidence that feeding mother's milk to pre-term infants is associated with lower risk of necrotizing enterocolitis (NEC), and

late-onset sepsis (LOS) increasing with decreasing gestational age and birth weight [10]. Long term beneficial effect of feeding pre-term babies by mother's own milk is different gut microflora, better cognitive development and even face differences in the risk of chronic diseases, such as obesity, Type 1 and Type 2 diabetes and cardiovascular disease [11]. Human milk contains live cells e.g. macrophages, polymorphonuclear leucocytes, T and B lymphocytes, stem cells and a range of antimicrobial factors (antiviral factors, secretory IgA, lactoferrin, lysozyme, B12 and folate-binding proteins, complement, fibronectin and mucin). These all factors play a major role support local immunological protection [12]. The host defence also improve enzymes, antioxidants and cellular components preset in human milk. Natural feeding infants experience fewer and shorter infections, exhibit different growth it contains not only nutrients necessary for their growth and development but also numerous bioactive factors that contribute to the beneficial effects of breastfeeding. The list of these factors detected in human milk is growing and includes hormones, growth factors, cytokines, and chemokines [13].

## FEEDING IN NICU

After birth, the breasts produce colostrum - the first food which receives is full of antibodies and high in protein but has less of carbohydrates and fats. The colostrum period lasts for about 1 week. Human colostrum also contain the highest concentrations of lactoferrin (7 grams of lactoferrin per 1 l colostrum). especially beneficial is to stimulate and often breast pump during that time. Colostrum administration after birth in pre-term infants is associated with improved weight gain and modification of the oral immunomicrobial environment [14]. Mother's own milk can be provided to the infant via breastfeeding or expression and feeding by an alternative method. Donor milk from a human milk bank is another source of human milk. Most mothers who give birth prematurely are able to produce just as much milk as mothers of full term babies, but very often the milk in breast appears later - a few days after birth. The best recommended alternative to feeding pre-term infants is donor milk bank. In this time it is important to begin stimulating the breasts as soon after birth as possible by using an effective double breast pump. Donor breast milk provides a tremendous relief for parents knowing that their infant can still receive human breast milk [15]. The hospital lactation consultant is an important member of the preterm baby's medical team responsible for instruct mothers how often to pump and how to store her breast milk [5]. Enteral feeding includes intragastric feeding, feeding by cup, bottle, spoon or paladai, and breastfeeding. A pre-term infant's progression to breastfeeding must pass through a number of stages before the infant begins to swallow, coordinate and then learn proper attachment and sucking. Standard practice in neonatal unit is to progress from bottle feeding to breastfeeding. Intragastric feeding is used when infants are too immature to swallow, coordinate feeds or which pathology limitating oral feeding [16]. Levels of fat and protein in human milk vary from the beginning to the end of each breastfeeding event, between stages of lactation, and as the result of the maternal diet (e.g., levels of DHA), according to concentrations of human milk variability. Supplementation or fortification may be requiring maintaining optimal nutritional status, especially for pre-term

infants. Nutritional supplementation is suggested to ensure nutritional adequacy of human milk for the premature infant.

## HUMAN MILK BANK

Human Milk Bank (HMB) provide an alternative to formula feeds for pre-term infants when mother's own milk is unavailable. HMB is a facility established with the purpose of selecting, collecting, checking, processing, storing, and distributing donor human milk, which is to be used for specific medical requirements [1]. At first, donors of human milk must undergo screening process similar to that used for donating blood, which includes an interview, serological screening and physician consent. Panel of blood test included: HIV 1 and 2 antibody, Hepatitis C antibody (anti -HCV), Hepatitis B surface ntygen (HbsAg), cytomegalovirus IgG and IgM antibody (CMV IgG and CMV IgM) and syphilis antibody [17]. Donor human milk must be checked microbiologically and should undergo heat treatment and storage procedures. All donor milk should be pasteurized at 62, 5°C for 30 minutes (Holder pasteurization) to destroy all microorganisms: bacterial content and viruses including human immunodeficiency virus HIV, human T-lymphotropic virus type 1, and cytomegalovirus (CMV) which are excreted in breastmilk. Holder pasteurization provides good compromise between microbiological safety and nutritional and biological quality of the human milk.

Many of the nutritional components are not altered or only minimally reduced in content through the process of pasteurization. Carbohydrates, fats, salts and fat-soluble vitamins are unchanged. However, pasteurization has also been shown to cause a significant reduction in IgA concentration and lysozyme activity, also reduces nitrogen retention, fat absorption, concentration of water-soluble vitamins, and antimicrobial factors such as viable leukocytes, immunoglobulins, lactoferrin, lysozyme, complement and folate-binding proteins [2,14]. Alternative sterilization methods to preserve innate bioactive properties and to decrease the cost of preparing donor milk are investigated. Using all of the aforementioned safety controls, there has never been a reported case of disease transmission through the use of pasteurized donor breast milk; however, this can never be absolutely assured [15]. "Parents should be fully informed of all treatment options available for their children. Parents must thus be made aware of the possibility for their children to receive human donor breast milk along with all of the perceived benefits and potential risks. They must also be made aware of the health advantages of human breast milk compared with bovine milk. They may then make an informed decision as to the best feeding plan for their baby. Written informed consent from parents/guardians must always be obtained before the administration of human donor breast milk [15]. Families and caregivers may be reassured that, at the time, 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 [18]. Accessibility to donor milk in many continues is limited in terms of supply, cost, and distribution. Because of these limitations, some parents may choose to exchange human milk that is not pasteurized or handled by an established milk bank with each other (milk sharing). The contamination of human

milk with cow milk has recently been reported. 10% of analyzed samples (all 102) contained both human and bovine DNA [19]. All efforts are focused on promoting breastfeeding and the creation of new human milk banks and as well as wide distribution of donor milk according to reduce the use of formula, especially in NICU.

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