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**M. Y. Malachynska, M. M. Kiselova,
O. L. Shlemkevych, N. S. Veresnyuk,
N. P. Kunta.**

Lviv Regional Clinical Perinatal Center,
Danylo Halytskyi Lviv National Medical University
(Lviv, Ukraine)

BREAST MILK BANKS – THE WAY TO GLOBAL BREASTFEEDING SUPPORT IN UKRAINE AND THE WORLD

Summary.

Breast milk is the standard of infant nutrition, recognized worldwide as the optimal first source of food, and breastfeeding is the ideal way to feed children, meeting all their needs. Breast milk is especially valuable for premature infants, who require specialized medical care from the first seconds of life and for a long time, and for sick newborns born at term. Preterm or sick preterm infants are most vulnerable to perinatal illness, have a high probability of dying and, most importantly, are at the greatest risk of not receiving the life-saving benefits of breast milk. In today's world, the World Health Organization and the American Academy of Pediatrics recommend the use of donor human milk as the first alternative for feeding preterm infants of any gestational age, including very preterm infants (<32 weeks gestation) or very low birth weight infants (<1500 g), when human milk is not available. Studies have shown that breastfeeding, even partial breastfeeding, reduces the risk of necrotizing enterocolitis and late neonatal sepsis, retinopathy of prematurity, and sudden infant death, improves cognitive outcomes in preterm infants, and helps establish optimal functioning of the digestive system and enteric digestive processes.

In many countries around the world, targeted support for breastfeeding in neonatal intensive care units, including enteral feeding of sick and premature infants, is provided by donor human breast milk that is concentrated and stored in an established and functioning network of breast milk banks.

A breast milk bank is an institution whose purpose is to collect breast milk from mothers who produce more than their infants need, and to process and store breast milk for the feeding of infants who, for medical or other reasons, cannot receive it temporarily or for a long period.

International associations of breast milk banks have been established throughout the world to promote the activities of banks and to establish international cooperation among breast milk banks.

The European Milk Banks Association (EMBA) was officially launched on October 15, 2010. There are currently 282 active banks in 31 European countries and 18 banks in the process of becoming active. The Southern African Milk Banks Association (HMBASA) was established in 2009. HMBASA coordinates the activities of the network of milk banks throughout the country. The North American Milk Banks Association (HMBANA) was founded in 1985 and brings together 30 non-profit breast milk banks in the United States and Canada. There is a positive trend in the establishment of new breast milk banks in all countries of the world. There are currently about 500 in 37 countries. Brazil is the world leader in breast milk banks, with 222 breast milk banks and 217 milk collection centers.

The first donor breast milk bank in Ukraine was established in 2019 in Kyiv at the Perinatal Center, where about 80 % of all premature babies in the city are born. In December 2022, when the country was at war, a high-tech breast milk bank was opened at the Lviv Regional Clinical Perinatal Center. This is the second bank of donated breast milk successfully operating in Ukraine on the basis of perinatal centers.

The operation of the breast milk bank at the Lviv Oblast Clinical Perinatal Center is one of the many modern high-tech areas of the healthcare facility. The breast milk bank is equipped with all the necessary equipment, which meets the highest modern world standards. Active daily teamwork of obstetricians, neonatologists, lactation consultants and mothers has allowed the bank to attract 32 donors of breast milk and collect more than 380 liters of donor milk since its opening. The first batch of donor milk was received on January 12, 2023.

Promoting the creation of a network of mother's milk banks in Ukraine at the state level will help to make a significant contribution to the preservation of the full healthy development of newborns and infants in our country, which has become especially important in the current military situation in Ukraine.

Key words: Breast milk bank; Breast Milk; Donor Milk; Donors.

Infancy is the most critical period in a child's life, as it is during this period that all structures differentiate and the main post-uterine regulatory mechanisms are formed, including the digestive, immune, endocrine and central nervous systems. Rational nutrition of infants and young children is one of the most important factors directly influencing their health and physical, psycho-emotional and intellectual development. Mistakes in nutrition and care made during this period of childhood cannot be corrected in later years of adulthood. According to the Convention on the Rights of the Child, every infant and

child has the right to adequate nutrition. It has been proven that malnutrition leads to 2.7 million child deaths annually, which is almost 45 % of all child deaths.

Therefore, feeding infants and young children can be considered one of the most important ways to improve child survival and ensure their healthy growth and development [1].

Breast milk is the standard of infant nutrition, recognized worldwide as the optimal first source of food, and breastfeeding is the ideal way to feed children, fully meeting all the needs of the child. In Ukraine, breastfeeding

has always been a traditional way of feeding and its benefits have never been questioned [2].

For a baby, breastfeeding means contact with the mother, familiar smells and sensations, physical comfort, satisfaction of the sucking reflex, a sense of security, a source of nourishment and life, the establishment of all bodily functions, and the formation and development of the immune, nervous, and endocrine systems. The absence of breastfeeding results in a deficiency of several key immunological components, including anti-inflammatory substances, antibodies and white blood cells [3].

The medical and psychological benefits of breastfeeding [BF] have been confirmed by numerous short- and long-term studies. Optimal breastfeeding is essential. If scaled up, BF could prevent approximately 823,000 child deaths, 13.8 % of all child deaths under the age of 2, and 20,000 women's deaths from breast cancer [4].

Protecting, promoting and supporting breastfeeding contributes significantly to achieving the Sustainable Development Goals on nutrition and health and is a key component of quality health care. Appropriate, evidence-based and timely support for infant and young child feeding in emergencies saves lives, protects optimal digestive processes, child health and development, and benefits mothers and families [5].

Breast milk is valuable for premature infants, who require specialized medical care from the first seconds of life and for a long time, as well as for sick newborns born at term. According to statistical estimates, 15 million infants, or more than one-tenth of all newborns in the world, are born prematurely each year, and more than 20 million children have low birth weight [6].

Babies born prematurely or sick preterm are most susceptible to illness and have a high probability of dying, and they are at greatest risk of not receiving the life-saving benefits of breast milk. For these newborns, their own mother's breast milk is the first best option for feeding, but due to various reasons, temporary or absolute contraindications on the part of the mother to breastfeeding, it is impossible to meet the nutritional needs of the infant with the mother's breast milk, then donor milk is the next best option.

The history of the use of donor milk dates back to ancient times when children were breastfed by a nurse who could be a friend, relative or stranger. The rules for breastfeeding are described in the Babylonian Code of Hammurabi (c. 1800 BC), and detailed criteria for selecting nurses can be found in ancient Greco-Roman texts. Greek and Roman mythology, the Bible, the Torah, and Islamic scriptures describe nurses who nursed babies who later became prominent figures such as the Prophet Muhammad [7-9].

After the eleventh century, aristocratic and royal families in Europe used the services of nurses. The transition from private services to milk collection and processing centers began in the early twentieth century.

In the modern world, the World Health Organization and the American Academy of Pediatrics recommend the use of donor breast milk from a breast milk bank as the first alternative for feeding preterm infants regardless of gestational age, including very preterm infants (<32 weeks gestation) or very low birth weight infants (<1500 g) [11-13].

Studies show that breastfeeding, even partial breastfeeding, reduces the risk of necrotizing enterocolitis and late neonatal sepsis, retinopathy of prematurity, and sudden infant death, and improves cognitive outcomes in preterm infants. Breast milk is essential for the optimal functioning of the digestive system and enteric digestive processes.

Studies support a reduction in the length of hospital stay for infants fed expressed donor breast milk, as evidenced by the results of studies reported in a systematic review, which found that the use of pasteurized donor breast milk was associated with a 46 % reduction in cases of necrotizing enterocolitis compared with feeding preterm or low-birth-weight infants with infant formulas (for term or preterm infants) [14, 15].

The use of pasteurized breast milk is associated with a 19 % reduction in the likelihood of neonatal sepsis for every 10 ml/kg of milk consumed daily during the first 28 days of life in very low birth weight infants compared with infants fed formula.

Among preterm infants who received some of their mother's milk, those who received donor breast milk had a 22 % lower incidence of bronchopulmonary dysplasia and required less mechanical ventilation, almost three days less, than preterm infants fed formula [16].

Studies have shown the need for targeted breastfeeding support in the NICU, especially for sick and preterm infants [17].

In many countries around the world, targeted support for breastfeeding in neonatal intensive care units, including enteral feeding for sick and premature babies, is provided by donor human breast milk that is concentrated and stored in an established and functioning network of breast milk banks.

What is a breast milk bank? A breast milk bank (BMB) is an institution whose purpose is to collect breast milk from mothers who produce more than their children need, and to process and store it for use in feeding infants who, for medical or other reasons, cannot receive it temporarily or for long periods. These are primarily preterm or very low birth weight infants, infants in neonatal intensive care units, and healthy newborns who are unable to feed on their own breast milk [8].

The principles and organization of donor breast milk banks in different European countries have been developed to standardize approaches to the organization and functioning of donor breast milk banks (DBMBs) at the level of modern world and European standards and are in line with the principles declared by the European Milk Banks Association (EMBA).

The first breast milk bank was established in Vienna in 1909 (Table 1). The following year, a second mother's milk bank opened in Boston, and others were established throughout the 20th century in the United States and Europe. By 1939, there were 20 milk banks in German-speaking countries, and by 1944, there were 50. Many of these banks were gradually closed in the 1980s due to the risk of HIV transmission.

However, many of them were later re-established, and the number of milk banks is currently growing. One of the reasons for this is the recognition of the benefits of using human milk and donor milk for both full-term and preterm infants compared to infant formula [18].

Table 1

History of the establishment of breast milk banks

1909 Vienna	First breast milk bank in Europe
1910 Boston	First breast milk bank in the United States
1943 USA	Recommendations of the American Academy of Pediatrics
1975 England	Five large banks are established
1980 WHO/UNICEF	Joint statement
1980 USA	Recommendations of the American Academy of Pediatrics
1985 USA	Founding of the Human Milk Banking Association of North America (HMBANA)
1993 USA	Recommendations of the Human Milk Banking Association of North America (HMBANA)
1994 p. Canada	Recommendations of the Canadian Pediatric Society
1995 France	National law of France on banks of women's milk
2010 Milan	European Milk Bank Association European Milk Bank Association (EMBA)
2014 p.	National Law of Italy on breast milk banks

In 1980, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) issued a joint statement supporting the use of human donor milk to feed low birth weight and preterm infants as a first alternative when the biological mother is unable to breastfeed [18].

The European Milk Banks Association (EMBA) was officially established on October 15, 2010 to promote breastfeeding and milk storage, to encourage the development of milk banks in Europe and to facilitate international cooperation between milk banks in Europe. The Association is based in Milan, Italy, and brings together milk banks, associations of milk banks and individuals who support the objectives of the Association. There are currently 282 active banks in 31 European countries and 18 banks in the process of being established. The largest number of milk banks among European countries are in Italy (39), France (36), Germany (31), Sweden (28), Finland (17), Spain (16) and Poland (16) [19].

In neighboring Poland, there are 16 milk banks located in specialized hospitals where premature and sick babies are born. Most of the milk banks in Poland operate under the auspices of the Breast Milk Bank Foundation [20]. In addition to the European association, communication between BHBs takes place through other international associations of breast milk banks. In particular, the North American Milk Bank Association (HMBANA) was founded in 1985. It brings together 30 non-profit breast milk banks in the United States and Canada [21].

The Southern African Milk Banks Association (HMBASA) was established in 2009. HMBASA coordinates the activities of a network of milk banks throughout the country [22-23].

A positive trend in the establishment of new women's milk banks can be observed in all countries of the world. Currently, there are about 500 WMBs in 37 countries [18].

Brazil is the world leader in breast milk banking. It has the largest network of breast milk banks in the world. From

the establishment of the first breast milk bank in the 1930s until today, there are 222 breast milk banks in Brazil and another 217 milk collection centers [24].

Despite the many benefits that BHM offers in many countries, the number of milk banks is still quite limited due to lack of political will, religious beliefs, or lack of trust in the health care system by mothers in populations with high rates of infectious diseases.

The history of the creation of breast milk banks in Ukraine began with proposals to open them in Ukraine in the scientific circles of the Association of Neonatologists of Ukraine, when a working group was created, developments were made to develop the clinical guideline «Breast Milk Bank», and the company NGO «Breast Milk Terminal» was established in 2018, which was registered in 2018 even before the creation and opening of the first breast milk bank in Ukraine, in Kyiv.

There are already two donor breast milk banks in Ukraine, located in large perinatal centers. Ukraine's first BDBM was established in 2019 in Kyiv, based on the perinatal center where about 80 % of all preterm infants in the city are born [25].

The second modern high-tech breast milk bank in Ukraine was opened at the Lviv Regional Clinical Perinatal Center in December 2022, when the country was at war. The informational and technical components of the project to establish the bank and the training of the staff were made possible with the assistance of the Association of Breast Milk Banks of Poland. The Lviv Perinatal Center has implemented a full cycle of neonatal care in accordance with international standards in one institution: from the Department of Anesthesiology and Intensive Care of Newborns, through the Department of Postnatal Care and Nursing of Premature Infants, to the Department of Medical Rehabilitation for Premature Infants and Young Children.

In 2022, the Lviv Regional Clinical Perinatal Center became the first in Ukraine in terms of the number

of medical care provided during childbirth. Last year 4689 children were born in the center. Every year, about 1000 of all newborns at the Lviv Perinatal Center are premature babies with low and extremely low birth weight. They, as well as sick full-term babies, are the first to receive donor milk. In the future, the Lviv Perinatal Center plans to provide donor breast milk to maternity hospitals in Lviv and neighboring regions [26-27].

Of all the children born in 2022, more than a thousand were born to internally displaced women. Even now, women who have come from other regions of Ukraine where hostilities are taking place are giving birth at the Perinatal Center, and their children could be fed with donor milk if necessary. This increases the value and importance of the work of the Breast Milk Bank in times of war. The operation of the breast milk bank is one of the high-tech areas of the Perinatal Center. The bank is equipped with all the necessary equipment that meets the highest modern international standards. These include special refrigerators with temperature indicators, freezers for milk storage, ultrasonic homogenizers for milk analysis, pasteurizers and other equipment. Since its inception, the bank has registered 32 donors and collected more than 380 liters of donor milk. The first batch of donated breast milk was received on January 12, 2023.

First of all, donor milk is used for premature babies and babies with extremely low and very low birth weight, who are born and nursed at the Lviv Regional Clinical Perinatal Center mostly from the Lviv region and Lviv city.

The smallest patient who received donor breast milk was a boy weighing 580 grams. He was born in the 24th week of pregnancy. The boy remained in the neonatal intensive care unit for 34 days, and when his condition became relatively stable, the child, weighing 1200 grams, was transferred to the post-intensive care unit for premature infants. During this time, lactation consultants helped the mother establish lactation so that she could overcome the stress of feeding her baby with her own milk and enjoy motherhood to the fullest.

At the same time, the boy was on a natural diet – he received donor milk, which has both nutritional and medicinal properties. The active participation of the mother, who trusted the doctors and was confident of success, played an important role. On the 91st day of life, the baby, weighing 2510 g, was discharged home and was able to be fed with his mother's milk. The teamwork of the neonatologists and the breast milk bank consultants resulted in an excellent outcome.

Donor milk can also be given to children who are temporarily unable to feed on their own breast milk due to medical contraindications. Mothers of children who are prescribed donor milk are happy to give their consent. Doctors note that children tolerate and absorb donor milk well.

Pregnant women are informed about the activities of the Breast Milk Bank at the Parenthood Academy, a regular lecture for pregnant women and their partners on preparing for childbirth. After the birth of a child, lactation consultants from the Perinatal Center work with each mother and, in addition to counseling mothers,

search for and recruit donors. Most of the donors to the Lviv Regional Clinical Perinatal Center's breast milk bank are women who have given birth at the Perinatal Center.

Thanks to the dissemination of information about the activities of the Breast Milk Bank, mothers who gave birth in other maternity hospitals began to apply to become donors in various modern ways. With the increase in reserves, the donated milk from the Breast Milk Bank will be used to meet the needs of newborns in other medical institutions in Lviv and the region.

Perhaps in time, when the number of donor milk banks in Ukrainian cities will increase several times compared to the current number, the NGO «Breast Milk Terminal» will become a leader in motivating all participants of the donor milk banking process to meet to discuss pressing issues, to make constructive decisions aimed at improving the work of each of the banks and to exchange experience on all components of the process, which will ensure the continuous functioning of the donor milk bank, a place of inspiration for generating new ideas to improve the work of the donor milk banks. At present, Ukrainian donor banks are guided in their activities by the Ukrainian Clinical Guideline (CG) «Collection, storage, transportation, processing and banking of donor breast milk» [7].

In accordance with the provisions of the Guidelines, the Bank's activities are carried out in the following stages

1. Screening of donors, who can be healthy women who are breastfeeding and willing to share their excess milk.
2. Serologic testing of the donor to exclude infection with hepatitis B and C, HIV and syphilis.
3. Collection of the milk.
4. Examination of the composition and microbiological purity of the donor's milk, its pasteurization (heating to a temperature of 62.5 °C to eliminate microorganisms).
5. Storage of donor milk in appropriate conditions (frozen) at a temperature of -18 to -20 °C.
6. Delivery of donor milk to neonatal units.

The decision to prescribe milk from the bank is made by a doctor in consultation with the bank's consultants, and the mother and father of the child agree to feeding with donor milk. If necessary, transport is carried out in accordance with the developed procedures.

The work of breast milk banks is aimed at protecting, promoting and supporting breastfeeding, as it provides access to breast milk for infants who cannot fully benefit from their own mother's milk [7, 8].

Therefore, the activities of breast milk banks should be considered as an integral part of the health care and maternal and child care system after childbirth, especially when the newborn requires long-term treatment or when breastfeeding by the biological mother is difficult for other reasons. This will increase children's access to the best nutrition, which is human milk.

Donor breast milk, like mother's milk, is not only a complete natural balanced nutrition for a newborn child, but also a special therapy for children who cannot be fed with mother's milk.

Thus, promoting the creation of a network of breast milk banks in Ukraine at the state level will help to make a significant contribution to the preservation of the full healthy development of newborns and infants in our country, which has become especially important in the current military situation in Ukraine.

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БАНКИ ГРУДНОГО МОЛОКА – ШЛЯХ ДО ГЛОБАЛЬНОГО ЗАБЕЗПЕЧЕННЯ ГРУДНОГО ВИГОДОВУВАННЯ В УКРАЇНІ ТА СВІТІ

М. Й. Малачинська, М. М. Кісельова, О. Л. Шлемкевич, Н. С. Вереснюк, Н. П. Кунта

Львівський обласний клінічний перинатальний центр, Львівський національний медичний університет імені Данила Галицького (м. Львів, Україна)

Резюме.

Грудне молоко – еталон дитячого харчування, що сприймається в усьому світі як оптимальне перше джерело їжі, а грудне вигодовування – ідеальний спосіб вигодовування дітей, який повноцінно задовольняє всі потреби дитини. Особливої цінності набуває грудне молоко для передчасно народжених дітей, які з перших секунд життя і впродовж тривалого часу потребують спеціалізованої медичної допомоги та для хворих новонароджених дітей, що народились вчасно. Діти, які народились передчасно або хворі доношені новонароджені найбільш схильні до захворювань специфічних для перинатального періоду та мають високу ймовірність смерті і, саме, найбільший ризик не отримати рятівних переваг грудного молока. Як першу альтернативу для вигодовування передчасно народжених дітей незалежно від гестаційного віку, у тому числі глибоко недоношених (<32 тижнів вагітності) або дітей з дуже низькою масою тіла (<1500 г) в сучасному світі Всесвітня організація охорони здоров'я та Американська академія педіатрії рекомендують використовувати донорське грудне молоко із банку людського молока., якщо власне молоко матері недоступне. Дослідження демонструють, що у дітей, що не мають можливостей отримувати материнське молоко, годування грудним молоком, навіть часткове, знижує ризик некротизуючого ентероколіту та пізнього неонатального сепсису, ретинопатії недоношених, раптової смерті немовлят і покращує когнітивні результати у недоношених дітей, сприяє встановленню оптимального функціонування травної системи і процесів ентерального травлення.

У багатьох країнах світу цілеспрямована підтримка грудного вигодовування у відділах інтенсивної терапії новонароджених, зокрема ентеральне харчування хворих та передчасно народжених дітей забезпечується донорським людським грудним молоком, що концентрується і зберігається у створеній та функціонуючій мережі Банків грудного молока.

Банк грудного молока – установа, метою діяльності якої є забір грудного молока від матерів, які виробляють його більше, ніж потрібно їхнім дітям, забезпечує обробку та зберігання грудного молока для годування немовлят, які з медичних або інших причин не можуть тимчасово або тривало його отримувати.

З метою сприяння діяльності банків та налагодження міжнародної співпраці між банками грудного молока в світі створено міжнародні асоціації банків грудного молока.

Європейська асоціація банків молока (ЕМБА) була офіційно започаткована 15 жовтня 2010 року. Нині в 31 країні Європи нараховується 282 банки, які активно працюють і 18 банків, які розпочинають свою роботу. У 2009 році була створена Асоціація банків молока Південної Африки (НМБАСА). НМБАСА координує діяльність мережі банків молока по всій країні. Асоціація банків молока Північної Америки (НМБАНА) заснована в 1985 році і об'єднує 30 некомерційних банків грудного молока США та Канади. Відзначається позитивна тенденція у створенні нових банків жіночого молока в усіх країнах світу. Нині їх нараховується біля 500 у 37 країнах світу. Світовим лідером у сфері діяльності банків грудного молока є Бразилія, там працює 222 банки жіночого молока, а також ще 217 центрів збору молока.

Перший Банк донорського жіночого молока в Україні було створено в 2019 р. у м. Києві на базі Перинатального центру, де народжується близько 80 % усіх недоношених дітей міста. Високотехнологічний банк грудного молока на базі Львівського обласного клінічного перинатального центру було відкрито в грудні 2022р., коли країна перебувала у стані війни. Це другий банк донорського грудного молока, який успішно функціонує в Україні на базі перинатальних центрів.

Діяльність Банку грудного молока у Львівському обласному клінічному перинатальному центрі – один із багатьох сучасних високотехнологічних напрямів роботи закладу охорони здоров'я. Банк грудного молока оснащений усім необхідним обладнанням, яке відповідає найвищим сучасним світовим стандартам. Активна, щоденна командна робота лікарів-акушерів, неонатологів, консультантів з грудного вигодовування, матерів дозволила з моменту роботи Банку залучити до здачі грудного молока 32 донори та зібрати понад 380 л донорського молока. Першу порцію донорського грудного молока було отримано 12 січня 2023 р.

Сприяння створенню мережі Банків грудного молока в Україні на державному рівні допоможе зробити вагомий внесок у збереження повноцінності здорового розвитку новонароджених і немовлят в нашій державі, що набуло особливої актуальності в часи воєнного сьогоднішнього дня в Україні.

Ключові слова: банк грудного молока; грудне молоко; донорське молоко; донорки.

Contact Information:

Mariia Kiselova – Doctor of Medical Science, PhD, MD, Professor, Chief of the Department of Pediatrics and Neonatology Faculty of Postgraduate Education Danylo Halytsky Lviv National Medical University (Lviv, Ukraine).

e-mail: maria.tchuiko@gmail.com

ORCID ID: <http://orcid.org/0000-0001-7668-411X>

Researcher ID: <http://www.researcherid.com/rid/Q-6735-2016>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=6603427861>

Mariya Malachynska – Director of the Lviv Perinatal Center; PhD, Associate Professor, Department of Obstetrics and Gynecology, Danylo Halytsky Lviv National Medical University (Lviv, Ukraine).

e-mail: malaschynska@ukr.net

ORCID ID: <https://orcid.org/0000-0003-2895-3666>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57433879800>

Nataliia Veresniuk – Deputy Director for Medical Quality of the Lviv Perinatal Center; Doctor of Medicine, PhD, MD, Associate Professor, Department of Obstetrics, Gynecology and Perinatology, Danylo Halytsky Lviv National Medical University (Lviv, Ukraine).

e-mail: veresniuk@ukr.net

ORCID ID: <http://orcid.org/0000-0001-5233-7105>

Researcher ID: <https://www.webofscience.com/wos/author/rid/Y-8949-2018>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57217244457>

Olha Shlemkevych – MD, PhD, Assistant at Paediatric and Neonatology Department of post-degree education faculty of Danylo Halytsky Lviv National Medical University (Lviv, Ukraine). Head of the Breast Milk Bank of the Lviv Regional Clinical Perinatal Center

e-mail: oshlemkevych@gmail.com

ORCID ID: <https://orcid.org/0009-0005-8425-4159>

Researcher ID: <https://www.webofscience.com/wos/author/record/JMB-3742-2023>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57841666700>

Nataliia Kunta – Assistant at Paediatric and Neonatology Department of post-degree education faculty of Danylo Halytsky Lviv National Medical University (Lviv, Ukraine).

e-mail: nataliakp4@gmail.com

Контактна інформація:

Кісельова Марія Миколаївна – доктор медичних наук, професор, завідувачка кафедри педіатрії та неонатології факультету післядипломної освіти Львівського національного медичного університету імені Данила Галицького (м. Львів, Україна).

e-mail: maria.tchuiko@gmail.com

ORCID ID: <http://orcid.org/0000-0001-7668-411X>

Researcher ID: <http://www.researcherid.com/rid/Q-6735-2016>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=6603427861>

Малачинська Марія Йосипівна – директор Львівського перинатального центру; кандидат медичних наук, доцент кафедри акушерства та гінекології Львівського національного медичного університету імені Данила Галицького (м. Львів, Україна).

e-mail: malaschynska@ukr.net

ORCID ID: <https://orcid.org/0000-0003-2895-3666>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57433879800>

Вереснюк Наталія Сергіївна – заступник директора з якості медичної діяльності Львівського перинатального центру; доктор медичних наук, доцент кафедри акушерства, гінекології та перинатології Львівського національного медичного університету імені Данила Галицького (м. Львів, Україна).

e-mail: veresniuk@ukr.net

ORCID ID: <http://orcid.org/0000-0001-5233-7105>

Researcher ID: <https://www.webofscience.com/wos/author/rid/Y-8949-2018>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57217244457>

Шлемкевич Ольга Любомирівна – кандидат медичних наук, асистент кафедри педіатрії та неонатології ФПДО Львівський національний медичний університет імені Данила Галицького, керівник Банку грудного молока Львівського обласного клінічного перинатального центру,

e-mail: oshlemkevych@gmail.com

ORCID ID: <https://orcid.org/0009-0005-8425-4159>

Researcher ID: <https://www.webofscience.com/wos/author/record/JMB-3742-2023>

Scopus Author ID: <https://www.scopus.com/authid/detail.uri?authorId=57841666700>

Кунта Наталія Петрівна – асистент кафедри педіатрії та неонатології ФПДО Львівський національний медичний університет імені Данила Галицького, завідувача відділення постінтенсивного догляду новонароджених і виходжування недоношених дітей

e-mail: nataliakp4@gmail.com



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