



**Modern Radiation Oncology.  
Innovation in personalised  
oncology: back to the future**

33° RESIDENTIAL COURSE

9 | 10 | 11 October 2023

Fondazione Policlinico Universitario A. Gemelli IRCCS  
Largo A. Gemelli, 8 - Roma - AULA Brasca

Scientific Coordinators: V. Valentini, M.A. Gambacorta, L. Indovina  
Honorary Presidents: C.A. Perazi, N. Cellini

**Onlus-BLUD  
Banca del Latte Umano Donato  
(Donated Human Milk Bank)**

***Giovanni Vento***

**Director, Division of Neonatology**

*Fondazione Policlinico Universitario A. Gemelli IRCCS  
Università Cattolica del Sacro Cuore, Roma*



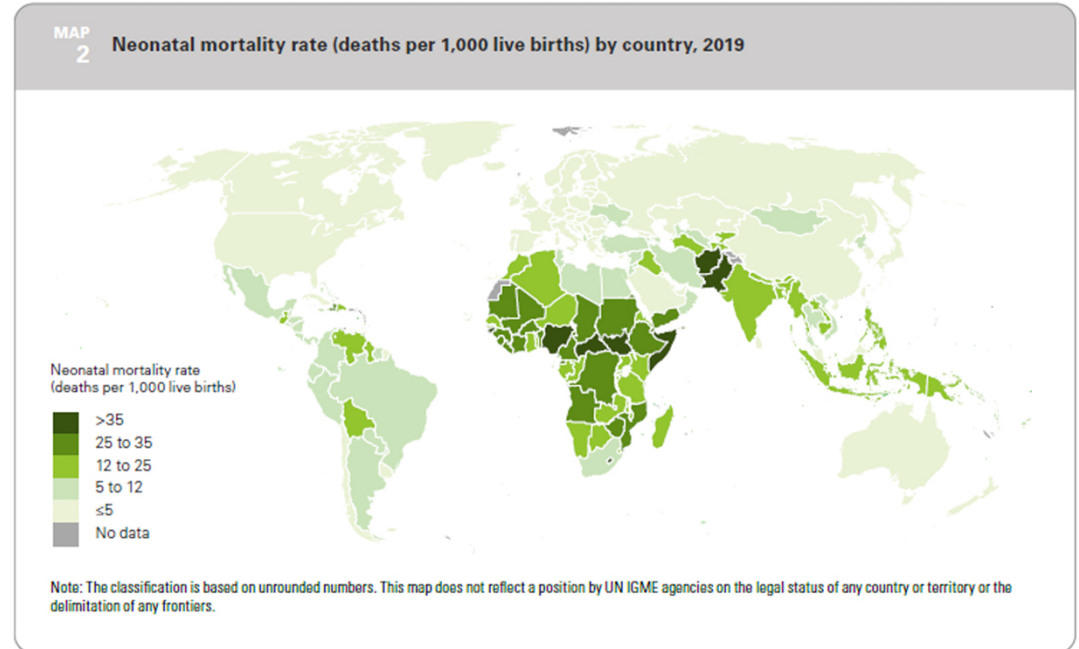
# Preterm birth: a major issue across the globe

An estimated 13.4 million babies (10%) were born pre-term in 2020, with nearly 1 million dying from preterm complications

Preterm birth is now the leading cause of child deaths, accounting for more than 1 in 5 of all deaths of children occurring before their 5<sup>th</sup> birthday.

	Estimated preterm birth rate* (%; UI)	UNDP estimated number of livebirths	Proportion of global livebirths (%)	Estimated number of preterm births (n, UI)	Proportion of global preterm births (%)
Asia	10.4% (8.7-11.9)	75 441 991	53.9%	7 847 643 (6 579 297-8 987 184)	52.9%
Europe	8.7% (6.3-13.3)	7 927 034	5.7%	690 931 (497 738-1 051 737)	4.7%
Latin America and the Caribbean	9.8% (8.6-11.3)	10 814 139	7.7%	1 062 800 (931 611-1 220 105)	7.2%
North America	11.2% (9.5-13.4)	4 394 185	3.1%	491 297 (416 475-578 367)	3.5%
North Africa	13.4% (6.3-30.9)	5 771 560	4.1%	773 687 (365 845-1 782 375)	5.2%
Oceania	10.0% (7.9-12.7)	643 749	0.5%	64 227 (50 706-81 961)	0.4%
Sub-Saharan Africa	12.0% (8.6-16.7)	34 953 292	25.0%	4 182 440 (2 994 834-5 838 104)	28.2%
Global	10.6% (9.0-12.0)	139 945 950	100.0%	14 835 606 (12 654 938-16 728 926)	100.0%

Regions are based on the United Nations Standard Country or Area Codes for Statistical Use (M49) major regional groups. UI=uncertainty interval. UNDP=United Nations Development Programme. \*Preterm births per 100 livebirths.

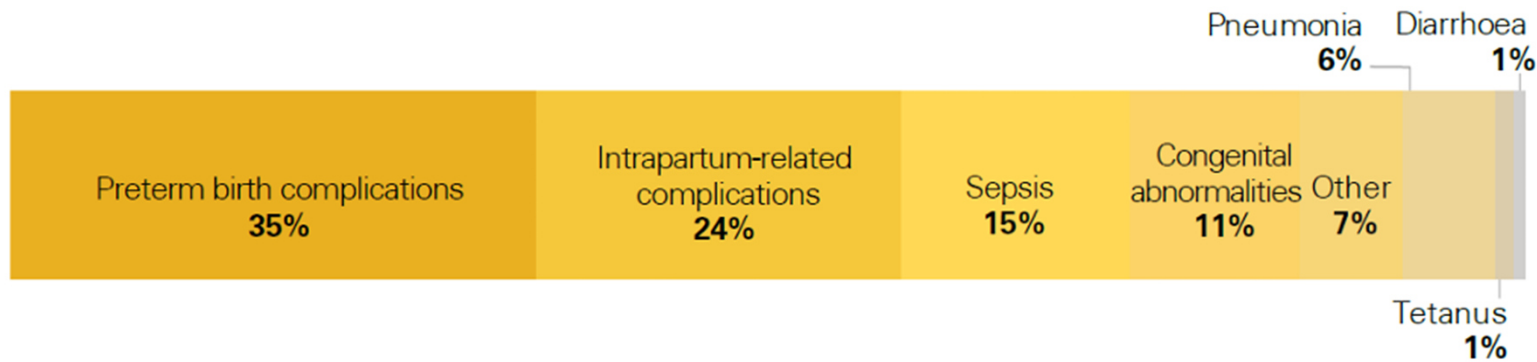


Southern Asia and sub-Saharan Africa have the highest rates of preterm birth, and preterm babies in these regions face the highest mortality risk. Together, these two regions account for more than 65% of preterm births globally.



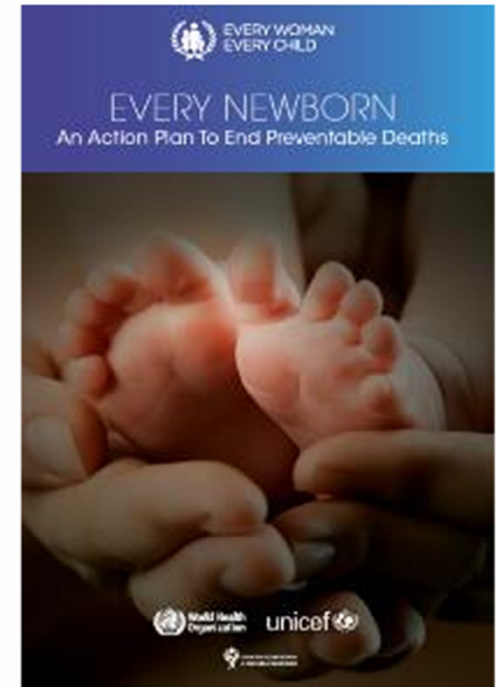
# CAUSES OF DEATH OF 2.400 MILLION NEWBORNS

## B. Global distribution of newborn deaths by cause, 2018



Note: Estimates are rounded and therefore may not total 100 per cent.

Source: WHO and Maternal and Child Epidemiology Estimation Group (MCEE) interim estimates produced in September 2019, applying cause fractions for the year 2017 to UN IGME estimates for the year 2018.

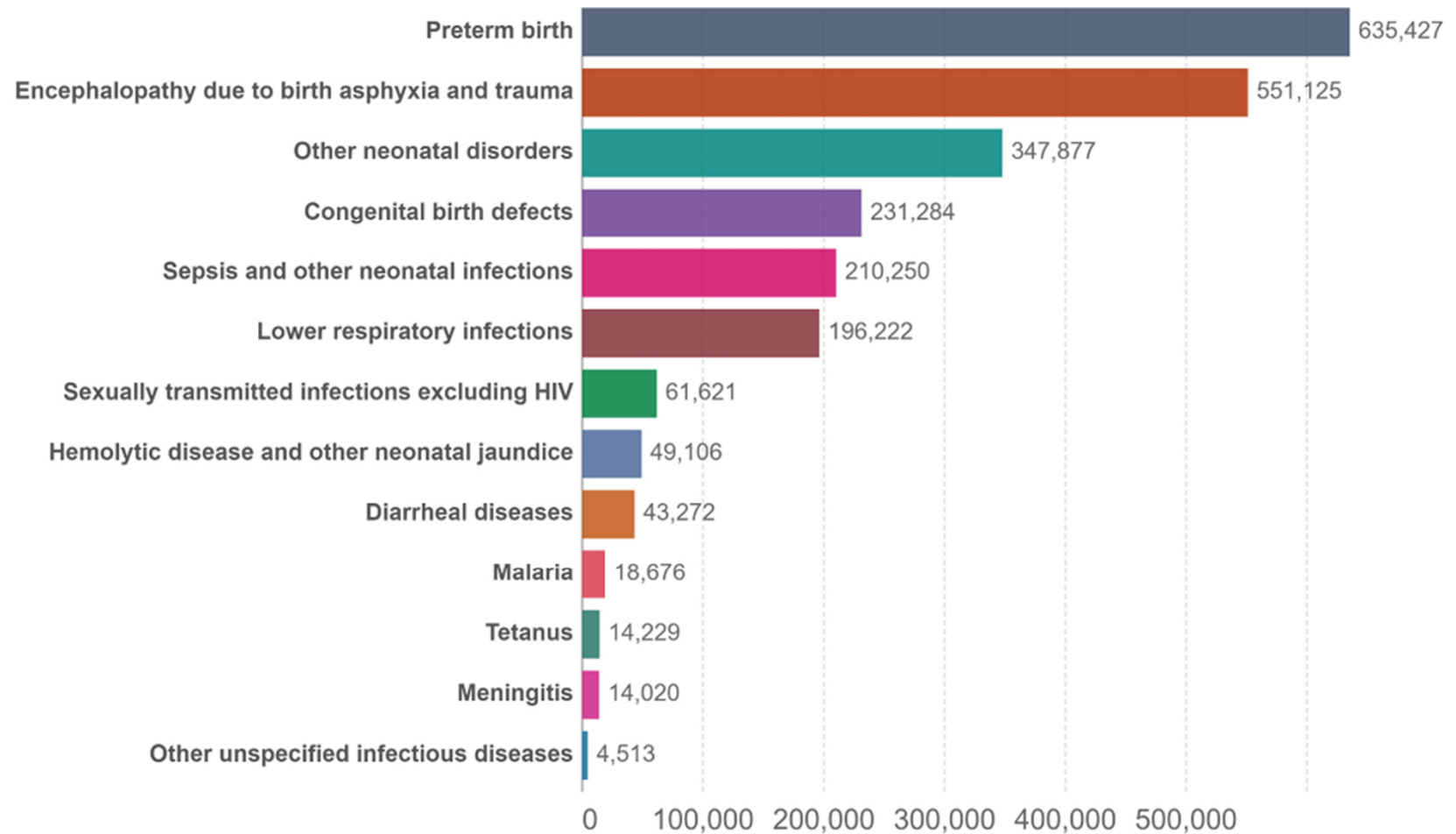


Levels & Trends in Child Mortality Report 2021

# Neonatal deaths by cause, World, 2019

Number of deaths during the first 0-27 days of child's life by cause.

Our World  
in Data



Source: Institute for Health Metrics and Evaluation

CC BY



Gemelli



Fondazione Policlinico Universitario Agostino Gemelli IRCCS  
Università Cattolica del Sacro Cuore



*Extremely preterm*  
infants  
(22-27 weeks)



*Very preterm*  
infants  
(28-31 weeks)



*Moderate preterm*  
infants  
(32-33 weeks)



*Late preterm*  
infants  
(34-36 weeks)



Preterm survivors can face lifelong health consequences,  
with an increased likelihood of disability and developmental  
delays



**Gemelli**



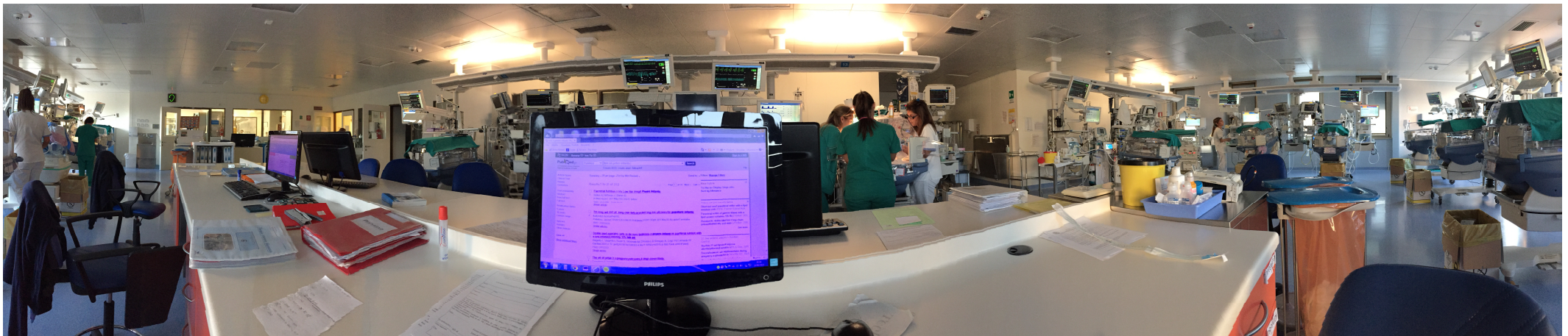
Fondazione Policlinico Universitario Agostino Gemelli IRCCS  
Università Cattolica del Sacro Cuore

# Neonatology Division at FPG: our wards and services

- Neonatal Intensive Care Unit
- Neonatal Sub-Intensive Care Unit
- Intermediate Care Unit

- Delivery-Room Intensive Care Unit
- Short Observation Neonatal Unit
- Rooming-In

- Follow-up Service



# Importance of human breast milk in premature infant

Simonetta Costa, Francesca Serrao, Chiara Tirone, Eloisa Tiberi, Mirta Corsello, Francesca Priolo, Milena Tana, Francesca Paola Fusco, Simonetta Frezza, Giovanni Vento

UOC Neonatologia, Dipartimento di Scienze della Salute della Donna, del Bambino e di Sanità Pubblica, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy

Simonetta Costa and Francesca Serrao equally contributed to this article.

Corresponding Author: Giovanni Vento, MD; e-mail: [giovanni.vento@unicatt.it](mailto:giovanni.vento@unicatt.it)

RESEARCH ARTICLE

## Effect of Early Expressed Human Milk on Insulin-Like Growth Factor 1 and Short-Term Outcomes in Preterm Infants

Francesca Serrao\*, Patrizia Papacci, Simonetta Costa, Carmen Giannantonio, Francesco Cota, Giovanni Vento, Costantino Romagnoli

Department of Pediatrics, Division of Neonatology, Catholic University of the Sacred Heart, Rome, Italy

# AIBLUD onlus: Italian association of donated human milk banks (HMBs)

Promotion of breastfeeding and breast milk donation with coordination role of all existing donated human milk banks in Italy (41) and promotion of the establishment of new banks



The image shows the cover of a report. At the top left is the SIN logo (Società Italiana di Neonatologia). At the top center is the text 'ASSOCIAZIONE ITALIANA DELLE BANCHE DEL LATTE UMANO DONATO'. At the top right is the AIBLUD onlus logo. The main title is 'Raccomandazioni per la costituzione e l'organizzazione di una Banca del Latte Umano Donato'. At the bottom, a list of names is provided: GIUSEPPE DE NISI, AMALIA MARIA AMBRUZZI, SERTAC ARSLANOGLU, ENRICO BERTINO, AUGUSTO BIASINI, LUIGI GAGLIARDI, GUIDO MORO, FABIO MOSCA, CLAUDIO PROFETI, GUGLIELMO SALVATORI, and PAOLA TONETTO.

**SIN**  
Società Italiana di Neonatologia

ASSOCIAZIONE ITALIANA  
DELLE BANCHE DEL LATTE UMANO DONATO

**AIBLUD**  
onlus

## Raccomandazioni

per la costituzione  
e l'organizzazione di una

# Banca del Latte Umano Donato

GIUSEPPE DE NISI  
AMALIA MARIA AMBRUZZI  
SERTAC ARSLANOGLU  
ENRICO BERTINO  
AUGUSTO BIASINI  
LUIGI GAGLIARDI  
GUIDO MORO  
FABIO MOSCA  
CLAUDIO PROFETI  
GUGLIELMO SALVATORI  
PAOLA TONETTO

**NEW**







## ADVANTAGES OF DONATED BREAST MILK

- **NECROTIZING ENTEROCOLITIS:** protective effect of breast milk vs formula milk which can damage the still immature intestinal mucosa, increase its permeability, alter the microbiota, trigger the upregulation of inflammatory mucosal responses.
- **FOOD TOLERANCE:** facilitates early start of enteral feeding and its progression.
- **BRONCHOPULMONARY DYSPLASIA:** protective effect of exclusive breast milk feeding (superiority of fresh versus donated breast milk)
- **In-HOSPITAL STAY:** reduction of the days of hospital stay
- **BREASTFEEDING AT DISCHARGE:** exclusive breastfeeding upon discharge has increased by approximately 20% where bank milk is available



## INDICATIONS TO DONATED BREAST MILK

- **Very Low Birth Weight (VLBW) infants: BW < 1500 grams**
- Newborns with gastrointestinal surgical pathology
- Newborns with heart disease
- Newborns with metabolic diseases (in particular aminoacidopathies)
- Infants with food allergies
- Newborns with chronic renal failure
- Full-term newborns waiting for own milk



## KEY POINTS OF A HUMAN MILK BANK

Milk donation must have the safety and biological quality requirements which are obtained by monitoring the process in all its phases, according to the HACCP principle (Hazard Analysis Critical Control Point).

- Selection of donors
- Collection, storage and transport of milk
- Infectious and quality controls
- Treatment (pasteurization)



## SELECTION OF DONORS

Breastfeeding support strategies: updating of healthcare personnel, bonding, breastfeeding support during hospitalization, post-discharge breastfeeding support, 24 hour NICU opening, Kangaroo-Mother-Care (KMC), an area dedicated to milk collection.

Donation support strategies: massive dissemination of the possibility of donating milk through pre-partum courses, in obstetric clinics, press, cultural events and social media. To offer the possibility of home collection.

To achieve good results, relevant and specific information must be provided with effective communication.





## DONORS SELECTION

Donors selection requires an approach similar to that practiced for blood donors, aimed at identifying specific conditions that contraindicate donation permanently or temporarily.

Permanent exclusion	Temporary exclusion
<ul style="list-style-type: none"> <li>• HBV, HCV, HIV, Syphilis, HTLV I and II</li> <li>• Creutzfeldt Jacob disease</li> <li>• Smoking, drugs, benzodiazepines</li> <li>• Xanthines &gt; 300 mg</li> <li>• Vegan diet without B12 supplement</li> <li>• Alcohol</li> <li>• Maternal pathology (tumors, transplants, systemic autoimmune diseases, chronic disabling pathologies)</li> <li>• Drugs incompatible with breastfeeding</li> </ul>	<ul style="list-style-type: none"> <li>• HSV, VZ, breast mycosis, TB, mastitis, contacts with patients suffering from infectious diseases (chicken pox, mumps, measles) if non-immune donor.</li> <li>• Relationships with partners positive for HBV, HCV, HIV.</li> <li>• Tattoos and piercings</li> <li>• Surgical interventions, diagnostic or therapeutic maneuvers.</li> <li>• Blood transfusion, blood products, hemodialysis.</li> <li>• Vaccinations</li> </ul>

UNIVERSITÀ CATTOLICA del Sacro Cuore  
Gemelli ART

MRO . ART  
ART 4 ART

**Modern Radiation Oncology.  
Innovation in personalised  
oncology: back to the future**  
33° RESIDENTIAL COURSE

9 | 10 | 11 October 2023

Fondazione Policlinico Universitario A. Gemelli IRCCS  
Largo A. Gemelli, 8 - Roma - Italia  
Scientific Coordinator: P. Mainardi, M.A. Gambacorta, L. Indovina  
Honorary President: C.A. Pignatelli, M. Cellini

# DONORS SELECTION

## XANTHINES < 300 mg/day



Cup of coffee: 80-90 mg of caffeine  
Cup of tea: 20-30 mg  
330 ml cola: 40 mg  
100 g chocolate 70 mg



## DONORS SELECTION

### ALCOHOL



- < 45 ml of spirits
- < 360 ml of beer
- < 150 ml of wine

UNIVERSITÀ CATTOLICA del Sacro Cuore

Gemelli ART

MRO . ART

Modern Radiation Oncology. Innovation in personalised oncology: back to the future

33° RESIDENTIAL COURSE

9 | 10 | 11 October 2023

Fondazione Policlinico Universitario A. Gemelli IRCCS  
Largo A. Gemelli, 8 - Roma - Italia

Scientific Coordinator: P. Altomare, M.A. Gambacorta, L. Indovina  
Honorary President: C.A. Pignatelli, G. Cellini

# VIRUSES AND BREAST MILK: TRANSMISSION OR PROTECTION?

About the risk of viral transmission, the distinction between the mere presence of nucleic acid or a virus particle in milk and the real risk of transmission is fundamental. Breast milk exerts an intrinsic antiviral action due to a plurality of protective factors that continue to be identified (oxysterols, glycosaminoglycans, extracellular vesicles). The major fields of research concern the thermal effects of pasteurization both on viral activity and on protection mechanisms.

**WHICH VIRUSES CAN BE TRANSMITTED THROUGH BREASTFEEDING?**

Virus	High risk of transmission through breastfeeding	Low risk of transmission through breastfeeding	Uncertain transmission through breastfeeding
HIV	X		
HTLV	X		
CMV		X*	
HPV			X
HSV 1/HSV-2	X (Through breast lesion)		
ZIKV			X
EBOLA			X
DENGUE			X
YFV (vaccine strain)		X	
WNV			X
HBV		X	
HCV		X (if mother's nipples and/or surrounding areola are cracked and bleeding)	
ANDV			X
SARS-CoV-2			X





## BIOLOGICAL QUALIFICATION TEST

- Before donation, molecular tests for HIV, HBV, HCV + serological tests for HIV 1 and 2, HIV antigen, anti HCV, HBsAg, VDRL and TPHA (gold standard)
- It is recommended that donors who report recent risk conditions perform tests no earlier than 2 months after the last event
- It is not necessary to repeat tests during the milk donation period if there are no changes in risk status; however, a new execution is justified if the donation lasts beyond 3 months



## COLLECTION, STORAGE AND TRANSPORT

- Before collection, carefully wash your hands and cleanse your breasts with water only
- Collection through manual squeezing or with breast pump
- All material used must be well sanitized
- Collection in glass or rigid plastic (polypropylene) containers, no bags
- The donor's identification code and the collection date must be written on each bottle
- The collected milk must be kept at room temperature for as little time as possible:  
Cool under running water → Refrigerator +2/+4 °C → freezer -20° C within 24 hours  
or  
Cool under running water → freezer -20° C within 24 hours
- Transport must take place with the cold chain (transport freezers, thermal bags with dry ice or refrigerating blocks, no ordinary ice).



## INFECTIOLOGICAL CONTROLS QUALITY CONTROLS

### BEFORE PASTEURIZATION

- At the beginning of the donation and during the donation, as appropriate
- Milk is not acceptable in case of: total bacteria  $> 10^5$  CFU/ml, Enterobacteriaceae  $> 10^4$  CFU/ml, Staphylococcus aureus  $\geq 10^4$  CFU/ml

### AFTER PASTEURIZATION

- Frequency defined on randomly selected batches
- Milk is not acceptable if aerobic bacteria are  $\geq 10$  CFU/ml

It is recommended to periodically verify all procedures carried out by the Bank with quality tests (including microbiological control on environment, equipment and operators involved), in compliance with the HACCP principles.



## PASTEURIZATION METHODS

### HOLDER PASTEURIZATION (+ 62.5 °C for 30 minutes)

- most studied and recommended method
- destroys pathogenic milk bacteria, including *Mycobacterium tuberculosis*, fungi, and many viruses (CMV, SARS-CoV2)
- Reduces some immunological factors and some macronutrients (IgA, IgG, lactoferrin, lysozyme, complement, proteins and fats)
- Other important nutritional factors remain intact (oligosaccharides, PUFA, fatty acids, gangliosides, amylase, vitamins)

### HTST PASTEURIZATION (+ 72° C for 5 or 15 seconds)

- Best compromise between microbiological safety and nutritional quality
- Equipment currently available only at industrial level
- Safety datas are still poor





## STORAGE OF MILK AT THE BANK

- Milk **collected at home** must be placed in the refrigerator and pasteurized as soon as possible, however within **24 hours**; if it is expected to last longer than 24 hours it must be placed in the freezer.
- Milk **collected at the bank** must be placed in the refrigerator and pasteurized as soon as possible, preferably within 24 hours, no later **72 hours**; if it is expected to exceed 72 hours it must be placed in the freezer.
- Milk frozen at a temperature equal or lower than  $-20^{\circ}\text{C}$  must be used within 3 months (preterm infant).
- Pasteurized milk can be stored in the refrigerator at  $+2/+4^{\circ}\text{C}$  and used within 48 hours.

**DEFROSTING:** can take place slowly in the refrigerator  $+2/+4^{\circ}\text{C}$  for a period of no more than 24 hours or quickly in a bain-marie with water at a temperature less than  $37^{\circ}\text{C}$  or under warm running water,



## STORAGE OF DOCUMENTS AND DATA

Documents can be stored on paper or electronic media and provides:

- the self-control plan (according to HACCP principles)
- operating procedures and quality control performed
- donors register (unique identification code assigned to the donor, personal data, date and week of gestation, start and end of the donation, quantity of milk donated, screening, informed consent)

Informed consent

- Donor's consent to the processing of personal data
- Consent of the donor to carry out serological tests and use her own milk
- Consent for the clinical use of donated milk



## Research Projects

- *Different composition of human milk related to different pregnancy disorders*
- *Maternal Factors and Milk Expression Patterns affecting the composition of Human Milk*

