

Report from the International Congress

The following is a summary of The Third International Congress of the Human Milk Banking Association of North America, entitled "100 Years of Milk Banking: Looking Back and Reaching Forward" held April 12-13, 2010 in Boston, Massachusetts. Contributors to this article include Naomi Bar-Yam, Frances Jones, Pauline Sakamoto and Amy Vickers.

Just after the 2007 HMBANA conference in Fort Worth, Texas, discussion began of where to hold the 2010 conference which would celebrate 100 years of milk banking in North America and 25 years of HMBANA. Boston seemed a perfect location; it is, after all, where milk banking began in North America.

More than two hundred attendees gathered at the Hyatt Regency-Cambridge for this important conference. The title, "100 Years of Milk Banking: Looking Back, Reaching Forward" aptly described the speakers presentations. Participants traveled from across the globe to attend this event. Countries represented include Australia, United Kingdom, Norway, Canada, Taiwan and Malaysia. There were 24 speakers in all presenting current research in the area of milk banking and infant nutrition. Below are some highlights from selected sessions.

Kara Swanson, PhD opened the program with the History of Milk Banking in the US. She highlighted the history of the first milk bank established in Boston on the floating children's hospital some 100 years ago. The pictures presented and stories of the people pioneering the program were fascinating.

Ekhard Ziegler, MD, renowned neonatal feeding expert and a member of the Vermont-Oxford group, gave a research oriented plea, "Don't Apologize for Donor Milk." He utilizes donor milk and mom's own milk for all of the infants in the NICU. He set the tone of the conference for attendees to examine individual institution's feeding choices.

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A Hero in More Ways Than One

by Lindel Millar



As you can imagine, donors of human milk come from all walks of life. We are grateful to all our donor moms, our heroes. Here is a story about one of our special heroes:

After taking three months off when my son was born, I had many concerns about continuing to pump while returning to work as a firefighter/paramedic. Somehow I had to make it work because I was determined to breastfeed for at least one year, if not longer.

My situation as a working mom is unique in many ways; I am on duty for 24 hours followed by 48 hours off duty. Working at one of the busiest fire stations in the city proved to be challenging as well. With such a chaotic schedule, I was not guaranteed breaks to pump. Somehow, I

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From the President

By Pauline Sakamoto, RN, MS

HMBANA celebrated our 25th Anniversary in grand style in Boston on April 12 and 13, 2010 with the Third Annual International Congress of Milk Banking in North America, "100 Years of Milk Banking: Looking Back and Reaching Forward." We had 24 excellent speakers from around the world and 212 attendees. As the title suggested, we looked at the history of milk banks and the national and international impact of milk banking and breastfeeding. The scope of research and clinical practices presented is the future of milk banking, infant feeding and utilization of donor milk.

from breastfeeding women wanting to send human milk to children in need, particularly those orphaned by the destruction. It is truly touching that North American women wanted to reach out to help homeless children with the priceless gift of human milk. Unfortunately, Haiti was plagued with no storage facilities that could accommodate the milk. Additionally, there are difficulties with transporting the donor milk, limited personnel to deal with the shipments and even less medical staff who know how to use donor milk. It became clear that the Haitian mothers who were lactating needed the support

"Although we had a record year in 2009, 1.5 million doesn't even come close to the 8 million ounces needed to feed the smallest of preterm infants born in the US and Canada."

— Pauline Sakamoto

Every presentation was thought provoking and expanded my perceptions of the potential uses of human milk. I want to applaud our Conference Committee and Naomi Bar-Yam who did a tremendous job with this conference. What I enjoyed the most was the ability to network with our international peers about infant feeding and donor human milk preparation. It is gratifying to be among the leaders of milk banking in the world. Dr. Miriam Labbock's presentation and call to action for the global milk banks was inspiring.

In the past few months, there have been a number of severe natural disasters which have become global issues and have impacted all of us. The importance of breastfeeding and nurturing the lactating mother in a disaster is paramount. The pictures from Haiti showed clearly the destruction and chaos that results after an earthquake in a third world country, already devastated by a poor economy. Many of us are moved to want to help. HMBANA received many inquiries

and care. The possibility of wet nursing, although problematic with their disease rates, may be the only alternative to starvation. Clearly, breastfeeding is the key to survival in a disaster, in whatever country one happens to be.

Communication is paramount. Traditionally, HMBANA's infrastructure is built on providing services within our borders. Although we had a record year in 2009, 1.5 million doesn't even come close to the 8 million ounces needed to feed the smallest of preterm infants born in the US and Canada. Can we do more? Yes, I think we can. Directors of HMBANA banks are passionate people and willing to do the work required. Do we see an avenue where we can help? Yes we do. During a disaster response effort is not the time to plan for a disaster! So I am challenging the HMBANA banks and disaster planning organizations to consider breastfeeding support and milk banking as part of the response. I know we can develop a plan that would save lives.

Q&A

FAQs: Starting a Milk Bank

By Amy Manning Vickers, RN, BSN, IBCLC, Executive Director; Mothers' Milk Bank of North Texas and Jean M. Drulis, B.A., Director and Co-founder, Mother's Milk Bank of Iowa

I want to start a milk bank in my community, how do I get started?

The first step to planning a milk bank is to assess the needs of the community to insure that a milk bank will be successful. Historically, milk bank successes have been related to the need for donor milk in the community in which the milk bank is established. Donor human milk is, in general, prioritized to premature and fragile hospitalized infants. With this in mind, communities that have more than one or two level III NICUs are the most appropriate for sustaining a milk bank. Additionally, communities with established breastfeeding support and high breastfeeding rates yield resources for a sufficient donor base. Highly motivated and supportive individuals in the community are essential to creating a task force or board of directors.

Once the need is identified, contact the Human Milk Banking Association of North America (HMBANA) to discuss further your plans. Even

though you have assessed the community need, HMBANA can advise whether existing milk banks are already serving your community/region.

Where can I obtain information on setting up a milk bank?

HMBANA has 2 manuals that provide valuable information on how to form a donor milk bank:

- "Guidelines for the Establishment and Operation of a Donor Human Milk Bank"
- "Starting a Donor Human Milk Bank: A Practical Guide."

These can be ordered online at www.hmbana.org.

How long does it take to set up a milk bank?

Launching a milk bank can be a lengthy process. Anticipate that it will take a minimum of 2 years to become a developing milk bank.

What is a developing milk bank?

A developing milk bank must be working towards and intending to meet HMBANA's definition of a milk bank as an organization that collects, pasteurizes and dispenses donor human milk according to the guidelines established by HMBANA.

How does an entity become a developing milk bank?

An entity applies for developing milk bank status by completing HMBANA's Developing Milk Bank Application. The finished form is submitted to HMBANA for review and approval.

A Tribute to a HMBANA Founder – Mary Rose Tully

by Frances Jones, RN, MSN, IBCLC

In August 2009 the HMBANA member banks received the distressing news that Mary Rose Tully had pancreatic cancer. Mary Rose promised us all not to worry she would be with us at the April HMBANA conference in Boston. Sadly it was not to be. Mary Rose died on January 20, 2010.

Mary Rose was one of the founders of HMBANA and worked tirelessly to support milk banking over the decades. She held a number of positions on the HMBANA board – secretary, vice president, president and past president. In addition, for many years Mary Rose used her excellent editing skills in writing the HMBANA *Guidelines for the Establishment and Operation of a Milk Bank* and coauthored the HMBANA document *Best Practice for Expressing Storing and Handling Human Milk*.

In recognition of all this work the Human Milk Banking Association of North America awarded the first HMBANA Lifetime Achievement Award for exemplary service to milk banking to Mary Rose at our 2007 international congress in Fort Worth, Texas. In presenting the award humor was a key element as Mary Rose had a wonderful sense of humor and a great laugh. I spoke of how Mary Rose's early life had prepared her for her career in milk banking - how her leadership skills came from being the eldest of eight children, her ability to deal with change came from frequent moves throughout her life and her business acumen from running a snow cone stand with her siblings in the summer as a teenager. I teased Mary Rose that the finances of a snow cone stand are probably similar to a small milk bank.



Mary Rose Tully

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Robert Lawrence, MD, known for his expertise in infectious diseases, reviewed viruses that may be troublesome in human milk. He presented that viral loading is more severe in utero than breastmilk transmission. In fact, human milk may have antibodies that are protective against the viruses and bacteria that the mother harbors. He reassured participants that human milk is unique and carries the ability to protect the infant.

Anders Hakansson, PhD, known for his medical school research on the Anti-tumor Activity of Human Milk at Lund University in Sweden, spoke on the latest research and findings of the HAMLET and BAMLET cells against cancer cells. It is exciting to know that clinical trials are coming soon. Current studies on Glioblastoma and human milk in animal studies are promising. Already studies on Papilloma and Hamlet Cells Salve show great improvement.

Frances Jones, MSN and **Gillian Weaver, RD** representing HMBANA and UKAMB with their combined expertise in international milk banking presented a world tour of the status of milk banks around the world. It was exciting to see how rapidly donor milk banking is growing globally on a local, national and international level.

Ardythe Morrow, PhD answered the difficult question, The Environmental Contaminants in Human Milk: Are they Harmful? She presented examples of contaminants being studied in human milk. The findings continue to support breastfeeding over concerns of toxic contaminants.

Jane Morton, MD, well known Pediatrician from Lucile Packard/Stanford Medical Center, presented her findings of effective strategies for assisting mothers to provide high caloric milk to their preterm infants. She discussed manual expression skills for health professionals and mothers.

Miriam Labbok, MD, Past President of UNICEF and Director of the Carolina Global Breastfeeding Institute, UNC Gillings School of Global Public Health presented "Are Developing Countries Ready for Milk Banking as we know it? Setting Priorities."



Ronald Cohen, MD, Director of the IICN at Lucile Packard/Stanford, Medical Director of the Mothers' Milk Bank in San Jose, Jon Allen PhD, professor at North Carolina State University and April Fogelman, graduate student at North Carolina State University presented results of a new study on the Effects of Calcium and Phosphorus Supplementation Effects on the Bioavailability of Nutrients in Human Milk.

David Newburg, PhD, presented his work on Oligosaccharides in Human Milk. His study showed the anti-bacterial and anti-viral mechanism of oligosaccharides found only in human milk.

Nancy Wight, MD, from Sharp/Mary Birch Hospital in San Diego presented a model of cost effectiveness of donor milk. In second breakout session, Dr. Wight discussed nutrition for the difficult infant who by size is normal but developmentally is immature in the NICU.

Deanna Francis, IBCLC, presented her experiences in getting donor milk into the level III NICU of Utah Valley Regional Medical Center.

Susanne Haynes, PhD from the Office of Women's Health presented the "Business Case for Breastfeeding." How Employers can benefit by supporting lactating employees on the job.

HMBANA member milk bank directors also presented a variety of breakout sessions including: **Frances Jones** on Storage and Handling, **Amy Vickers** on Setting up a Donor Milk Bank and **Kim Updegrove** on the Safety of Donor Milk. Case studies were presented

by representatives from HMBANA milk banks. **Donna Miracle** and **Jessica Welborn** presented a breakout session reporting research on the Bereaved Donor.

Martha Illige, MD, Medical Director of the Denver Mothers' Milk Bank, closed the conference by challenging us to invent ways to make milk banking "stick in people's minds." Her examples include catchy slogans, visual markers and marketing so the general public recognizes our mission and services.

Our spectacular celebratory dinner, held on the 16th floor of the hotel with a panoramic view of Boston, began with a short movie on the history of HMBANA. Dinner was followed by a presentation by **Kevin Douglas West**, director and producer of a short film called "Mother's Milk." This film was shown at several film festivals including the Sundance Film Festival. The film is the story of a mother who delivered a stillborn infant and chose to donate her milk in memory of her infant. It was a thought provoking film that brought discussion on how healthcare professionals can do a better job of supporting bereaved mothers and how milk banks play a therapeutic role in healing and the grief process.

This conference was dedicated to **Mary Rose Tully**, one of our conference committee members, one of the founders and long time board member and past-president of HMBANA. Mary Rose passed away after a courageous battle with pancreatic cancer in January 2010. We are truly saddened that she could not be with us to see the amazing network of professionals passionate for breastfeeding and human milk banking. She was deeply missed.

The HMBANA conference was a wonderful success, an inspiring and joyous blend of research, clinical practice, networking and celebration. The over 200 attendees including physicians, nurses, researchers, lactation consultants, midwives, dieticians and administrators were enthusiastic and energetic. Many were energized with new information from the various disciplines and many ideas were developed for new research projects and collaborations. The location for the 2012 conference will be announced soon. We look forward to gathering again for this important sharing of information. See you all then!!

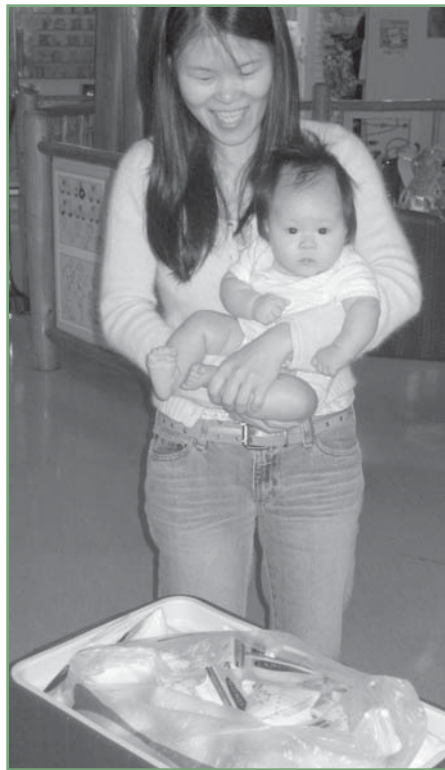
BC Women's Milk Bank: The oldest Milk Bank in Canada

By Frances Jones, RN, MSN, IBCLC, coordinator BC Women's Milk Bank, Vancouver, BC

This year the BC Women's Milk Bank celebrates thirty-six years of operations. It has operated continuously as an in-hospital milk bank providing pasteurized donor milk to both inpatients and outpatients during this period. The milk bank was born during the seventies when there were a number of banks in Canada and HMBANA had not as yet been formed. Over the years our bank has witnessed numerous changes.

During its years of operation the BCW Bank has functioned in a variety of spaces including a small shared office, a diet kitchen and currently a basement space adjacent to the formula room for BC Children's & Women's Hospitals. From this small space our team of two milk bank technicians who work 1.5 FTEs (full time equivalents), do all the processing, handling and stocking of donor milk for the hospital with the formula room providing individually labeled donor milk to Children's Hospital and the BC Women's NICU. The administration of the bank and all donor screening is completed by C & W Lactation Service.

This year has been a landmark year for our small milk bank. The milk bank technician's FTEs have increased from 1.0 to 1.5 FTEs and the amount of milk processed has increased dramatically to 70,000 ounces. Until 2008 the BC Women's Bank averaged 35,000 ounces/year over the previous ten years so 2009 marks a dramatic increase. In addition, the NICU has moved to using pasteurized donor milk from the milk bank for trophic feeding for gut priming when mother's



own milk is not available. Our step down unit started using donor milk about 4-5 years ago. This is a significant shift from the early nineties when all of mother's milk for their own babies was pasteurized by the milk bank.

Currently we are the only milk bank in Canada. In 2009 we provided milk to over 1000 children – a wonderful legacy for a small bank. There is an increasing demand for donor milk across Canada and we look forward to additional positive changes including the development of other Canadian banks in the near future.



From the Journals

By Kim Updegrave, RN, CNM, MSN, MPH
Chief Clinical and Operating Officer
Mothers' Milk Bank at Austin

Sullivan, S, 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 of Pediatrics 2010; 156: 562-67.

Researchers conducted a randomized controlled multicenter trial seeing to address the lack of contemporary trials of exclusive human milk feedings in extremely premature infants. Infants were fed human milk-based human milk fortifier with either mom's own milk or donor human milk, and it was hypothesized that positive outcomes would include reduced use of parenteral nutrition, reduced rates of late-onset sepsis, and NEC, without detrimental effects on growth.

207 Infants were recruited over 14 months from NICUs in 12 locations in the United States, and 1 in Austria. Eligibility criteria included birth weight of 500 to 1250 g, intention to receive mother's milk, initiation of enteral feeding before 21 days after birth, and initiation of PN within 48 hours of birth. Three groups of 69 infants each were selected, and all infants received human milk. Groups of infants differed as to the type of HMF received, and the type of milk given if no mother's own milk was available. Two groups received pasteurized donor human milk-based HMF when the enteral intake was 100 mL/kg/d and 40 mL/kg/d, respectively, and both groups received pasteurized and standardized 20 Kcal/oz donor human milk if no mother's milk was available. The third group received a more typical feeding protocol of bovine milk-based HMF when the enteral intake was 100 mL/kg/d and pre-term formula if no mother's own milk was available. Trophic feedings were initiated 1 to 4 days post birth and were continued at 10 to 20 mL/kg/d as tolerated for up to 5 days. Subsequently, milk intake was increased by 10 to 20 mL/kg/d.

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RECIPIENT PROFILE

Rachel and Jane

By Laraine Lockhart Borman, IBCLC, Mothers' Milk Bank, Presbyterian St. Luke's Medical Center, Denver, Colorado



While preterm and sick babies are the primary focus for the Mothers' Milk Bank in Denver, we also serve healthy newborns and babies who

have minor health challenges or the late preterm with temporary difficulties when we have a good supply of milk and mom's own milk is not available. In recent years we have had an increase in both donor mothers who were gestational surrogates and recipient babies born to surrogates. The trend is positive for both parties in this situation, and for the Mothers' Milk Bank.

Rachel and Jane were born via surrogate in October of 2009. Their parents had called in advance to order donor milk in anticipation of the birth. Weighing in at 6 lbs 7 oz and 7 lbs 1 oz, the babies were 36 weeks gestation and spent only 4 days in the hospital. Their parents, who live in New Jersey and had been excited to start a family but without the

ability to carry babies, had contacted a reproductive lawyer who introduced them to the generous woman who would carry the two embryos. The parents roomed in at the hospital during and after Rachel and Jane's birth. The experience was an amazing bonding experience and the birth mother had a hard time saying goodbye to the new family.

The surrogate mother pumped and fed the babies colostrum, then continued to pump for two more weeks. When her milk was not enough for two, donor milk filled in the gap. After the surrogate mom was done supplying milk, the Mothers' Milk Bank took over for the long haul. The twins have gain weight at a very good rate and been very healthy all through their time on donor milk, making both their parents and doctors happy. This situation could have turned out differently without donor milk.

The Mothers' Milk Bank supplied about 300 ounces of milk every week, shipping it all the way to New Jersey. While large quantities of milk are distributed locally, much of our milk is also shipped to recipient hospitals and individuals in other

states. We have shipped to over thirty states, from Alaska to Florida. Shipping can be a challenge for milk banks as the milk is frozen and perishable. The milk is packed in special containers on dry ice, but inclement weather and other delays can affect the storage time and temperature of the milk. On more than one occasion, winter storms interrupted the delivery of milk to the twins. When milk needed to get to them the same day after a delay by the shipping company, milk bank staff took the milk to the airport in Denver; it was put on a commercial flight and picked up safely later that evening at the airport in New Jersey.

Raising twins is a difficult thing for two working adults, so the twins' parents were able to work out an alternating family leave schedule for the first nine months. They feel very fortunate to be able to have this special newborn time with their precious girls (now six months) and they are grateful to milk donors for making it possible to provide human milk to Rachel and Jane. Their health has been excellent and the parents attribute this to donor milk.

Mary Rose Tully

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More importantly, I spoke of all that Mary Rose achieved professionally. In the mid 1970s, Mary Rose established the Piedmont Milk Bank and at one point operated in a freezer in her basement. Mary Rose was the Coordinator of the Piedmont Milk Bank, a volunteer position for almost ten years. During this time she worked on a research study at Wakemed in North Carolina, she became their first lactation consultant and worked with breastfeeding women. Between 1993 to 2001, she was the Coordinator of the Lactation Services and Milk Bank at Wakemed. From 2001 until her death she was the Director of Lactation Services at Women's & Children's Hospitals UNC Healthcare, Chapel Hill; an Adjunct Associate professor, School of Public Health, University of North Carolina and; faculty in the Center for Infant & Young Child Feeding & Care at UNC.

In addition to all this, Mary Rose was the ILCA conference planner for many years, has written numerous papers, worked on numerous academic projects, sat on innumerable committees, volunteered on boards, and taught, travelled and worked with breastfeeding families.

Mary Rose leaves her husband Doug, her son Christopher, daughter-in law Tania and beloved granddaughter Anika as well as her mother and siblings. She will be sadly missed by those who knew her and her influence felt by many that did not.

In honor of her life, contributions can be made to:

1. A Mary Rose Tully Memorial Fund to benefit her seven year old granddaughter Anika and for un-paid medical bills. Checks may be sent to the Mary Rose Tully Memorial Fund, c/o Karen Britt Peeler, Attorney at Law, P.O. Box 12154, Raleigh, NC 27605.

2. The Mary Rose Tully Training Initiative at the Global Breastfeeding Institute Please visit http://www.sph.unc.edu/make_a_gift/ or mail a check made out to this fund to Attn. Peggy Dean Glenn, UNC Gillings School of Global Public Health, Office of External Affairs, 107 Rosenau Hall, Campus Box 7400, Chapel Hill, NC 27599-7400.

In addition, there is the Mary Rose Tully Scholarship Fund Cruise to be held on August 21, 2010. The plan is to meet in Wilmington and enjoy the Cape Fear River from 11-1pm. More information can be found at www.wilmingtonwatertours.com. The cost is \$45 for adults (age 13 and up) with \$10 being donated to one of the above Mary Rose Tully Scholarship funds. You can sign up by emailing mary_overfield@yahoo.com or calling 919-847-4903.

had to pump enough milk to get my son through the next 24 hours when I was on duty.

There were many times I would frantically “wolf down” my meal while pumping in my bedroom. If I chose to sit at the table and take fifteen minutes to eat with the rest of my crew, I would not get another chance to pump for several hours.

I remember one extremely hectic day when I did not have a chance to pump for seven hours because of back to back emergencies. Needless to say, I thought my breasts were going to explode, and I was really glad that it was in the middle of the summer so people thought the front of my shirt was wet because I was sweating.

Another shift when I did not have a chance to pump for hours, I developed a painful area in my breast. While continuing to watch the switchboard to not miss a call, I stood in the ladies locker room shower, praying for some relief.

Another time we were scheduled to attend an all day drill at our training academy. I knew it was imperative I find a way to pump. I sat on the cold concrete floor of a bathroom and pumped, the cord from my pump barely reaching the electrical outlet. I walked out of the bathroom trying to look nonchalant with my breast pump slung over my shoulder and headed back to my fire truck.

My goal was to pump at least 20 ounces a shift, so I had to pump four or five times in a 24 hour period. Some of the other women I work with had babies before I did, but they chose only to breast feed until they came back to work, so I couldn't really ask anyone for advice. Luckily, a friend who works for a neighboring fire department was also pumping at work. We would call each other, usually while pumping, to compare notes.

Sometimes I was discouraged wondering if it was worth it, but then I would become inspired by something I would read or from the wonderful encouraging women at La Leche League. I knew how important it was for my so that I “keep on pumping,” so I continued.

As my son grew older and started on solid food, he did not need as much breastmilk as I would pump, fortunately, I learned how to donate it.

One day, I searched online for information on breastmilk donation and found the Mothers' Milk Bank. During this process, a friend told me of a 19 week old baby diagnosed with leukemia who was given little hope of survival. This little baby was facing chemotherapy and bone marrow transplants. The doctors told the baby's mother that one of the best things for her son was breastmilk. But, the mother was no longer breastfeeding. I realized how much I could help tiny sick babies by donating my milk. This baby did receive donor breastmilk and is getting closer every day (almost a year later) to being a leukemia survivor.

Donating milk was also especially important to me, because in my job I had been witness to many situations where donor human milk was needed. There was a mother in preterm labor and her little baby had to spend several weeks in a NICU. The mother was unable to produce breastmilk for her baby. This baby needed donor milk.

I was there to help deliver the premature baby to the drug- addicted mother. I knew that precious baby would need breastmilk to survive through drug withdrawals and weeks or even months in the NICU.

My son just turned two and I am starting to wean him. This is a slow process because evidently he hasn't read the memo yet, and is not showing any signs of wanting to stop nursing. But that is ok, we are taking it slowly.

I am still pumping at work, but only once or twice a shift now and every drop that I pump is going to the wonderful milk bank to help tiny precious babies.

Donating breastmilk has been one of the most important things that I have ever done. Is it worth it? More than anyone will ever know.

*“I saw the sick babies in the NICUS
when I would bring other sick children to the hospitals,
and I knew how important it was for them to get breast milk.”*

— Lindel Millar

Return Service Requested

From the Journals

There were no significant differences among study groups for the duration of PN, length of hospital stay, late-onset sepsis, or growth, however, significant differences were noted for rates of NEC. The two groups of infants receiving human milk with HMF experienced significantly fewer cases of NEC in comparison with the infants receiving bovine milk-based HMF. A significant difference also was observed for the combined outcome of NEC or death in human milk-fed infants vs. those receiving bovine HMF (2%, 3%, and 15% respectively). All cases of surgical NEC occurred in infants who received bovine HMF sometime before developing NEC. Multivariate logistic regression controlling for confounding variables known to affect the incidence of NEC found a 77% reduction in the odds of developing NEC while receiving an exclusive human milk diet (50% reduction in development of NEC, and 90% in development of surgical NEC). Infants in all 3 groups received a large volume and proportion of their enteral intake as their own mother's milk (>70%).

Researchers conclude that for extremely premature infants, an exclusively human milk-based diet, whether mother's own milk or donor human milk is associated with a significant reduction in the rates of NEC and surgical NEC compared with dietary exposure to bovine milk-based products.

Czank, C, Simmer K, Hartmann PE. Design and characterization of a human milk product for the preterm infant. *Breastfeed Med.* 2010; 5:59-66.

Researchers created a human milk product (HMP) through lactoengineering as an alternative to the commercially available fortifiers, using a technique of separating the cream and skim milk, ultrafiltrating the skimmed milk portion to increase the protein, and then adding the concentrated human milk protein to the cream. They then studied the changes in biochemical, structural, and microbiological characteristics of the HMP. Ten batches of milk were created

with the aim of achieving a protein:energy ratio of 3.0 g of protein/100kcal, and then tested.

Comparisons were made between pooled and pasteurized human milk fortified with commercially available fortifiers (Nutriprem and S26 SMA), and HMP in relation to macronutrient levels, osmolality, particle distribution and microbiology. While the protein to energy ratios were achieved in the HMP, significant differences were seen in composition of milk fortified with HMF, versus HMP. HMP vs. HMF had significantly higher levels of fat, lower levels of lactose, and lower osmolality (292 to 314 after ultrafiltration compared with 431 and 413 with commercial fortifier. Pasteurization of the milk led to 80% clean microbiology cultures. The researchers conclude that HMP can be designed to accurately target the protein and energy requirements of the preterm infant, but modifications of the macronutrient, biochemical, structural, and microbial characteristics of human milk may affect the quality of the final product.

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