

T H E F I R S T G I F T SM

Dedicated to all who participate in cord blood collection.



St. Louis Cord Blood Bank

SSM Cardinal Glennon Children's Medical Center
St. Louis University Department of Pediatrics

The First Gift SM



The Case for Collecting Larger Units

Dr. William Ferguson, MD, Cord Blood Bank Director

Over the last 4 decades, hematopoietic stem cell transplantation has become well established as a curative therapy for a variety of diseases—not only those related to failure of bone marrow function such as aplastic anemia and inherited immunodeficiencies, but also a variety of hematologic malignancies and selected metabolic disorders.

Just as for other organ transplants, immunologic rejection directed against both major and minor histocompatibility antigens plays a major limiting role, although instead of the recipient rejecting the graft, in this case the transplanted bone marrow—being the ultimate origin of the immune response—rejects the body (“graft-versus-host disease”). For this reason, transplants from a fully HLA-matched sibling—who matches at a proportion of minor antigens as well as sharing the major histocompatibility antigens—tend to have the least risk of both graft rejection and graft-versus-host disease. However, at present less than a quarter of patients who would benefit from hematopoietic stem cell transplantation have a matched sibling donor.

Successful transplants can be performed from unrelated donors, but the incidence and severity of graft-versus-host are significantly increased. One of the major advantages of cord blood as a stem cell source is that there tends to be less graft-versus-host disease, result-

ing in less stringent need for complete major histocompatibility matching; whereas most unrelated donor transplants will succeed only with genetic identity of at least 5 out of the 6 most important HLA antigens, cord blood can be successful with only 4 out of 6 antigens matched, and the HLA-A and -B loci need only be identical by less-stringent serologic typing.

While cord blood is a rich source of hematopoietic stem cells (allowing successful transplants with even relatively small cell doses), engraftment does tend to be slower than when bone marrow is used as the donor source. This effect is particularly relevant as the degree of mismatch increases—in practical terms, this means that transplants matched at all 6 HLA antigens have high success rates even at the lower range of cell doses, whereas there is a higher risk of failure at the lower range of cell doses when 1 or 2 antigens are mismatched. Thus, transplant physicians are often faced with a complicated choice: whether to use a more-completely matched unit with a smaller cell dose, or a larger—but less well matched—unit. This is even more relevant in larger recipients, for whom only units with the largest cell doses are likely to result in successful transplantation.

In the final analysis, larger cord blood volumes are advantageous for two reasons: not only in enabling transplant into larger recipients, but also enlarging the pool of potential donors for smaller recipients by allowing the use of partially mismatched units.¹



Three Proven Benefits of Cord Blood

Dr. Brandon Triplett, MD, Medical Director

The benefits of unrelated umbilical cord blood (UCB) use for hematopoietic stem cell transplant have been known for more than a decade. Rapid availability, lack of donor attrition, and lower rates of GvH for a given degree of HLA match have allowed UCB to become the primary alternative for children who lack a suitable matched family or unrelated volunteer donor.

Recently, the Center for International Blood and Marrow Transplant Research (CIBMTR) compared 503 children with acute leukemia who were transplanted with UCB to 282 children who received volunteer donor bone marrow. The 5-year leukemia free survival (LFS) was equivalent in patients who received a one- or two-antigen (intermediate resolution) mismatched UCB versus an allele level (high resolution) matched volunteer donor. There was also a suggestion that matched UCB had superior LFS when compared to an allele-matched volunteer donor. Importantly for survivors, the rates of chronic GvH are likely lower in matched or single-mismatched UCB transplants as well.²

Low cell dose remains the greatest obstacle to the effective use of UCB for transplant of larger children and adults. Promising work in the areas of enrichment and expansion of cord blood stem cells

continue to progress, but few methods are beyond pre-clinical testing. However, recent experience from University of Minnesota has found the use of dual UCB units to be safe and effective at improving engraftment in adult patients.³ Subsequent study by that same group has shown that double cord blood transplant not only overcomes the dose limitations of single UCB transplant for adults, but it also allows the successful utilization of nonmyeloablative UCB transplant in adults with acute leukemia.

The National Marrow Donor Program has documented an increasing genetic heterogeneity in the U.S. population. This may make finding a suitably matched volunteer donor more difficult in the future. As we continue to develop methods for overcoming the dose limitations of UCB transplants in adults, the permissive matching allowable in UCB will provide a curative option for many in whom a matched volunteer donor cannot be found.⁴ UCB transplant is even becoming the product of choice for many children who do have a matched volunteer donor available. Clearly, the continued growth of global cord blood inventory will have significant benefits for children and adults with high-risk diseases.

Thank you for all that you do to facilitate this life-saving therapy.



A Community Effort Impacts the World

Donna Regan, Executive Director

Fourteen years ago, four well known scientists and physicians from around the world were invited to Cardinal Glennon for a special symposium to present their experiences with a new medical therapy using cord blood to reconstitute hematopoiesis in children with blood disorders. Inspired by their successes and motivated to find well matched donors for our own patients, the concept of a cord blood bank to create an inventory of stem cells here in St. Louis was born.

Obstetricians and delivery staff in the region embraced the notion that a community collection model was the most effective way to offer the option to all women, day or night, at all institutions — and provided the greatest opportunity to create a diverse inventory. News of the success of transplantation with our products into patients locally quickly spread, and soon physicians from around the country were requesting our products for their patients.

Over the years, the use of cord blood has expanded to treat over 70 diseases and success in adults now matches that observed in children. Initially considered a ‘fad’, cord blood has been widely recognized as a safe, effective therapy, and validated by President Bush and the US Congress through the passage of the Stem Cell Act in December of 2005. Because these stem cells are acquired after their role in supporting a healthy full-term pregnancy, its use is also supported by the church as a non-controversial source of stem cells.

Today, members of the St. Louis Cord Blood Bank serve on many professional organization committees, contributing our knowledge and experiences to advance the field. But most importantly, the participation of this local community has a positive international impact, saving lives and providing hope to patients and their families here and in countries all over the world.



You are Making a Difference

Kathy Mueckl, Nurse Coordinator, Collections

After almost 13 years of cord blood collections, our primary goal has not changed; to create an inventory of stem cells as a means to escalate patient access to therapy. This is not possible without all of you. The obstetricians and midwives are the first to promote the program, and then perform the actual collection. The nurses, who also recruit and identify donors, coordinate the process at the participating hospitals. And the community, that recognizes the importance of the program, passionately chooses to donate cord blood with the hope of saving a life.

Obstetricians and midwives, we need you to continue to actively promote the program and encourage expectant families to register for the program prior to delivery. At delivery, we need you to collect as much blood as possible. Our biggest obstacle to banking usable units is the volume of blood collected. We need at least 50cc of cord blood before we can evaluate the unit further. Collect until the umbilical vein collapses or the blood stops flowing. Bigger is better and provides more choices for the adult patient population.

Labor and delivery staff, we need you to continue to be advocates for the program and identify donors at the time of delivery. Your role is critical to the process. Beginning with asking moms if they are a donor, to signing consents, obtaining maternal samples of blood, having the collection supplies available at time of delivery, completing the labor and delivery form; all steps are crucial to a proper collection. And don't forget, LABEL, LABEL, LABEL.

Every one of us plays a vital role in the process. Our actions and the extra steps we take in our busy day can make the difference in someone's life. Even though we may not know the person we help, we can feel good that we made it possible. I think a mom said it best: “Chemo is starting to take a toll on our sweet little one. I wait for the day that her body accepts the donor's cells and she will no longer need chemotherapy. I never thought we would be in a situation where we were completely dependent on a stranger's actions.”

What you do makes a significant difference.

¹ Gluckman E and Rocha V. Donor selection for unrelated cord blood transplants. *Current Opinion in Immunology* 2006; 18:565-570.

² Eapen et al. Outcomes of transplantation of unrelated donor umbilical cord blood and bone marrow in children with acute leukaemia: a comparison study. *Lancet*. 2007. 369:1947-1954.

³ Barker et al. Transplantation of 2 partially HLA-matched umbilical cord blood units to enhance engraftment in adults with hematologic malignancy. *Blood*. 2005. 105:1343-1347.

⁴ Brunstein et al. Umbilical cord blood transplantation after nonmyeloablative conditioning: impact on transplantation outcomes in 110 adults with hematologic disease. *Blood*. 2007. 110:3064-3070.

The People of the St. Louis Cord Blood Bank



The staff of the St. Louis Cord Blood Bank is made up of scientists and other professionals committed to the production, storage and distribution of high quality stem cell products for the purpose of fighting disease and saving lives.

Since 1994, the cord blood bank team has seen many changes in names and job descriptions, but one thing that has remained constant is the passion and dedication of the individuals who have served to make this therapy available to the patients who need it.

It starts with our **collection team** who recruits, enrolls, and educates our medical colleagues and delivering families about the donation process. Besides creating awareness about donation throughout the community, this group also evaluates donor eligibility based on factors designed for the safety of the patients who receive these products.

Our **technical team** characterizes the cell populations contained in each collection and processes those that meet processing criteria, according to current good manufacturing guidelines, into products for future transplantation. Through further laboratory studies, this group also evaluates potency of the products to ensure optimum engraftment prior to distribution.

Our **bioinformatics team** manages data regarding donors and products, making each product visible to transplant centers around the world for selection. This team further analyzes the outcome of each patient who is treated with these products in relation to the quality of the products, therapeutic protocol, and patient disease.

Our **search and export team** matches products in our inventory to patients, communicates with the transplant teams to aid in selection, and physically coordinates distribution around the globe in a manner that protects product integrity and public safety.

The **administrative team** is responsible for ensuring the quality of the products, the plasticity and fiscal responsibility of program operations, and compliance with increasingly stringent standards.

The clinical experience of our **medical directors** imparts the perspective that guides experimental laboratory studies and provides insight into future therapeutic applications of cord blood cell populations.

The evolving nature of this still investigational activity requires that all members of the team develop and expand their skills on a daily basis. The local community, like you who have embraced our mission by investing efforts to encourage donation and provide collections to our program can be confident of the enthusiasm, dedication, and compassion of this team of individuals who believe in what they do and are committed to doing it well.

Adult Leukemia Patient Saved by Cord Blood

Once considered to be a therapy best reserved for pediatric patients, cord blood stem cell transplantation is proving to be effective for more and more adults. This certainly was the case for Susan Fister of Medina, Ohio, a 52-year-old married mother with two grown sons.



Diagnosis

In April, 2003, Susan Fister noticed she was getting a lot of small bruises. By August, she was fatigued and achy. She chalked that off to working two jobs. But then, a fall later on that month caused a large bruise from her shoulder to her elbow. The injury probably saved her

life because she went to her doctor for a check up, and was diagnosed with acute myelogenous leukemia (AML).

Chemotherapy

After the first induction of chemotherapy, she developed an infection that put her in the ICU for three weeks. After the infection was treated and rehab was completed in November, Susan received a second induction of chemotherapy. A bone marrow biopsy in January of 2004 showed the AML was in remission.

Stem Cell Transplants

An allogeneic stem cell transplant using bone marrow stem cells was performed in February 2004, but failed the third week in May. Another bone marrow transplant using the same donor was performed in June, only to fail also. Then in August 2004, Susan received a cord blood stem cell transplant that engrafted successfully. As a result, Susan is healthy and active today.

Advantage of Cord Blood Stem Cells

Dr. Mary J. Laughlin, a pioneer in cord blood transplantation in adult patients, attributes the success of Susan's transplant to the flexibility of cord blood stem cells which makes them less likely to be rejected by the recipient.

"In Susan Fister's case, both her bone marrow transplants were a perfect 6 out of 6 match – and yet they failed where cord blood succeeded," Laughlin explains that the problem is that our immune systems get smarter with age. "Cells from new born babies haven't had the benefit of all that education and therefore are much more willing to be adopted into a new person's body," she points out.

St. Louis Connection

Susan Fister's stem cells came from the St. Louis Cord Blood Bank. Her life-saving cord blood unit was the result of the generous efforts of one of hundreds of caring doctors and midwives who deliver babies at our 29 participating hospitals. It was also the outcome of the hard work of dedicated nurses who provided donor education, collected maternal blood samples, and coordinated all the supplies and forms that ensured that the unit could be banked.

New Start on Life

Like other adult transplant patients, Susan Fister now has the blood and immune system of a toddler. She had to go to the doctor for "well-baby" visits at a year, year and a half, and two years to get her vaccinations for childhood diseases. "I just turned four this August," she says of her immune system. Susan, like many other adult transplant patients, reports that injuries heal faster than expected for her age.

Thank you for your interest in my story — Sue Fister

As a Result of Your Generosity...

St. Louis Cord Blood Bank is the second largest independent public cord blood bank in the world. Of the 70,000 cord blood units listed on the National Marrow Donor Program Registry, over 17,000 units (about 25%) have been provided through the generous efforts of the doctors, midwives, and nurses who collect blood for the St. Louis Cord Blood Bank.

Cord Blood: The Preferred Choice for Children

Cord blood has become the most frequent source of stem cells for transplantation in children in the United States, and is gaining increased usage in adults. This is a contrast to the early days of cord blood transplantation when it was only performed as an alternative to bone marrow transplants when an adult matched related or unrelated donor could not be found.⁵

For the Gifts of Hope and Life

Honor Roll

The St. Louis Cord Blood Bank recognizes the following individuals who collected 100 units or more in the 12 months between 8/1/07-7/31/08. Together they banked 140 cord blood units.

Douglas Gates MD ▶ 213

Kevin Foster DO ▶ 143

Timothy Philpott MD ▶ 104

Joe Herrmann MD ▶ 107

Gina Dietrich MD ▶ 100



Dr. Douglas Gates, Carbondale, Illinois, continues to be the top collector for the St. Louis Cord Blood Bank. He has held this position since 2003. His enthusiasm and generous efforts for this program are truly appreciated.

The St. Louis Cord Blood Bank gratefully recognizes the following physicians and midwives for their participation in our program during the past twelve months ending 07/31/08.

Olufunke Abiose MD
Akua Afriyie-Gray MD
Christopher Ahlering MD
Erol Amon MD
Mallika Anand MD
Brian Andrews MD
John Anstey MD
John Appelbaum MD
Raul Artal MD
Laura Baalman MD
Sangeeta Babar MD
R. Don Bale MD
Susan Barr MD
Michael Barron MD
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Karen Baum CNM
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Shanon Forseter MD
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Craig Frayer DO
Charles Freeman MD
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Kristina Garnett MD
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Eran Hahn MD
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