

The Infinite Potential of Stem Cell

Japan's Cord Blood Bank and Transplant

Speech by Dr. Tsuneo A. Takahashi

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Japan and the United States are the two most experienced countries in the field of cord blood transplant today. However, does anyone know the historical root of cord blood transplant?

**The First Transplant: Umbilical
Cord's Ability to Create Blood
Cell Production**



Towards the end of the 1980's, Dr. Hal E. Broxmeyer from the department of microbiology and immunology of Indiana University's School of Medicine proved that our umbilical cord blood is a rich source of stem cells that can form new blood vessels called hemangioblasts. These stem cells are better than bone marrow stem cells because they are better gene carriers when used to treat different types of hereditary diseases.

Dr. Hal E. Broxmeyer, Dr. Eliane Gluckman from Saint-Louis Hospital in Paris and Dr. Joanne Kurtzberg successfully performed the first cord blood transplant in 1988 in France for a five years old boy, Matthew Ferrell, who was suffering from Fanconi anemia. They used the umbilical cord blood from Matthew's brother to perform the transplant. Up to now, Matthew Ferrell is still healthy. Since then, Dr. Hal E. Broxmeyer has performed more than 2000 cases of cord blood transplants. He started with cord blood transplant from mainly related sibling donors, but in 1993 he started to perform unrelated donor transplants as well.

The Effect Compares Favorably with Bone Marrow Transplant

Up until now, more than 7,000 patients

in the world have undergone cord blood transplant for the treatment of different diseases including, blood tumor, bone marrow deterioration, and hereditary immune system imbalance. There are many benefits in performing cord blood transplants, for example cord blood can easily provide a rich source of stem cells, lower risk of infectious disease contamination, and etc. These reasons make it the top choice for replacing the procedure of unrelated donor's bone marrow transplant.

This fast growing numbers are the result of many people's hard work. For the past few years, many countries have set up numerous cord blood banks to collect and store umbilical cord blood including local cord blood banks in Japan. Many experts have launched large scale clinical studies and through careful evaluation and statistics, they found that cord blood transplants are just as effective as bone marrow transplants.

There are more than 50 public cord blood banks in the world today, with the collection of over 44,000 bags of cord blood. After HLA separation testing and recording, the bags of cord blood are immediately frozen for storage and then this information is released to other cord blood and bone marrow transplantation information centers for matches. BMDW and NETCORD are the

two largest cord blood data systems in the world to help with cord blood matching.

Japan Advocates Cord Blood Banks to Provide Additional Hope for Survival to Patients Worldwide

In many Asian countries, cord blood banking and transplantation have become a rapidly growing business. In Japan, we have already provided records of 23,860 bags of cord blood to the eleven cord blood banks, which are members of the Japan Cord Blood Bank Network(JCBBN), for unrelated cord blood transplantation. Four out of the eleven cord blood banks are non-profit organizations. Nevertheless, compared to the records of 300,000 bone marrow data, this is not much. However, we hope through the help of the Health Ministry, we can reach the goal of 50,000 bags of cord blood. Right now, we have 40 transplant hospitals, which are servicing more than 90% of Japan's populations, as our partners. As of October 24, 2005, Japan has already performed 2,582 cord blood transplants.

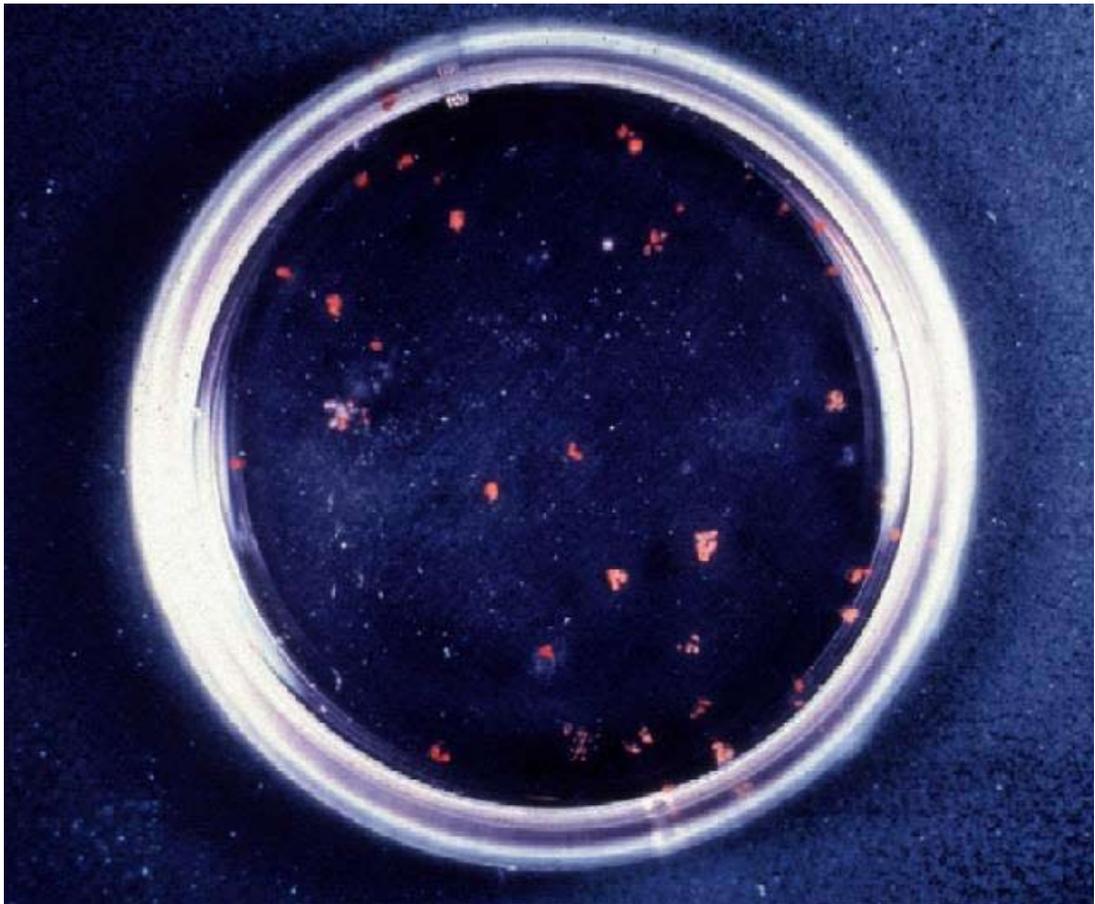
Tokyo Cord Blood Bank provides a seminar to educate medical personnel from doctors to nurses every 10 days. Our facilities are just like Tzu Chi's cord blood banks where all procedures are needed to be done in an aseptic room. We also use the BioArchive system. The University of

Tokyo's cord blood bank has nearly 6,000 bags of cord blood. This blood bank has already provided cord blood to 400 cases of cord blood stem cell transplantation, not only in Japan, but also 4 bags to United States and 1 bag to England, Chile, Australia, New Zealand, and Hong Kong, and 3 bags to Vietnam.

Globalized Matching System Will Provide Hopes for Both Adults and Children

It is very important to enhance the awareness of the cord blood's quality. In 1997, through the formation of NETCORD, it allowed cord blood banks from all over the world including New York, Tokyo, and etc, to provide data for public use. Its only downside is that there were no standardized procedures and quality control at that time. The United States in 1996 formed the Foundation for the Accreditation of Cellular Therapy (FACT) to enforce the standardized procedure of stem cell treatment. From 1996 until June 2005, FACT has already provided accreditation for 132 units using stem cell therapy.

Asia Cord was formed in 2000 in Bangkok with members from Beijing, Tianjin, Taipei, Seoul, Ho Chi Minh, and Tokyo with Singapore as its newest member. These banks must follow the international standard for cord blood banking and



Cell colonies developed from the collection of cord blood, to ensure cord blood is clean during the collection process.

transplantation in order to become a member of Asia Cord. These members must also participate in finding cord blood matches for patients.

In 2004, Tzu Chi cord blood banking joined Asia Cord. The mission of Asia Cord is to enhance the quality of cord blood

storage, to bring higher quality of service to Asians living in different parts of the world and to promote cord blood transplants and related research. Asia Cord has accumulated 92,617 bags of cord blood and has already used 297 bags of cord blood on children and 327 bags of cord blood on adults.

Comparison of Unrelated Donors in Cord Blood Transplant and Bone Marrow Transplant

	Cord Blood Transplant	Bone Marrow Transplant
HLA Match	4/6-6/6	6/6 (six pairs of HLA has to match)
Donors Information Bank (Japan)	20,000	300,000
Collection Agency	Cord Blood Banks and Hospitals	Bone Marrow Transplant Centers
Coordinate	None	Three to six months
Per Unit of Stem Cell #	Depending on total amount & the patients' weight	Can collect enough for transplant
Anti-Host Repeel risk	Relatively low	Relatively high

Enhance the Quality of Cord Blood Storage and Improve Transplant Technology

We should not be satisfied with our current situation, moreover, we need to actively work on enhancing the quality of cord blood storage and improve the procedure of cord blood transplantation. The density and quantity of the stem cells in adults' cord blood transplants are the key factors in determining the success rate of the transplantation.

To increase the success rate of transplantation, many doctors use numerous bags of cord blood during the transplantation with low dosage of chemotherapy before the

surgery. These methods produce effective results for transplantation. However it's important to remember that cord blood transplantation is relatively new and therefore, we need more data before we can determine the long term survival rates.

Cord Blood Transplant Is the Mainstream Procedure at the University of Tokyo

In recent years, the growth of cord blood transplants has been faster than bone marrow transplants. At the University of Tokyo, we only perform adult transplantation. Even though we have 20 years of experience in transplantation, but we have recently made a major change which is to use cord blood for

about 95% of our transplantation.

Next, I would like to share with everyone the clinical studies of cord blood transplants at the University of Tokyo. From August of 1988 to February of 2005, we have had 123 patients ranging from the ages 16-55 (median age of 37), weighing between 36-76 kg (median weight 55kg), including 53 patients with Acute Myeloid Leukemia (AML), 19 patients with Acute Lymphocytic Leukemia (ALL), 6 patients with Chronic Myeloid Leukemia (CML), 9 patients with Myelodysplastic Syndrome, 5 patients with non-Hodgkins Lymphoma (NHL), and etc.

Low Rejection Rate and High Survival Rate Make Blood Cord Transplants Full of Potential

The results of the surgery were very successful. The patients had low rejection rates of the stem cells and the patients were only hospitalized on average for about 128 days. To the 32 low risk patients, the

reoccurring rate is 3.3 % on average and the rate of infection is only 7.3 %. For the other 50 high risk patients, the reoccurring rate is 32.7% on average and the rate of infection is about 48.2 %. When comparing the results of bone marrow transplants and cord blood transplants, we find that the patients that had cord blood transplants have a lower rejection rate of the new stem cells and a lower rate of reoccurrence; the survival rate is much higher.

The key to a successful operation really depends on the doctor knowing when it is the best time for the transplant, the preparation of the operation before hand and the similarity of the HLA separation of the Japanese people. These are all important factors that contribute to the success of the operation. We are still doing more clinical studies and we welcome all medical teams from all over the world to join us in development and research to help more blood cancer patients.



Dr. Tsuneo A. Takahashi is the cord blood transplant specialist from The Institute of Medical Science at The University of Tokyo. He made a speech on November 19, 2005 at Tzu Chi's Bone Marrow Center on the topic of bone marrow stem cell transplant. The seminar included Japan's and the world's experience, and information about cord blood transplant and storage.

Tzu Chi Commissioners play a great role in building up Tzu Chi Stem Cells Center and are still volunteering in promoting donor registry everywhere.

Right after the celebration of 1 million donor registry, Tzu Chi Stem Cells Center held the AsiaPacific Donor Registry Conference and invited marrow donation experts in the world got together in Hualien on April 6-7, 2006.

