

Lifeline

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Discarded after birth, the placenta and umbilical cord may yet prolong countless other lives long after it nourished a baby in its mother's womb. By Gina Abuyuan Llanes.

The placenta is a baby's lifeline to her mother. It is an organ that develops in the uterus during pregnancy and, through the umbilical cord, links the blood supplies of the mother and the baby. Beyond giving life inside the womb, the placenta and umbilical cord – rich sources of cord blood – perform another service to the baby.

Doctors use cord blood to assess the health of the unborn child, particularly in high-risk pregnancies, says Dr. Corazon Almirante, a consultant obstetrician-gynaecologist and perinatologist at the Philippine Children's Medical Center. According to Dr Alicia Tamesis, pediatrician and adolescent medicine specialist at the St. Luke's Medical Center in Manila, cord blood is also used to evaluate the status of the newborn; blood chemistry profiles, blood type, and blood counts can be obtained without pricking the baby.

Shortly after the baby is born, the placenta is expelled with other redundant tissues collectively known as the "afterbirth". After nine months of faithfully performing its function, the placenta is finally discarded. End of story.

Cord Blood and stem cells

Not exactly. Ten years ago, researchers found another use for cord blood: it is a rich source for stem cells, undifferentiated cells that produce all other cell types in the body. This discovery opened the doors to new methods of treating cancers, blood problems, and other diseases – but not without controversy. "Cord blood and its rich content of stem cells have great potential," says Almirante, "but it's still very controversial. Right now, it's still in the experimental stage."

According to the Bioethics Advisory Committee of Singapore, stem cells are cells that produce all other blood cells, including blood-clotting platelets, and red and white blood cells, and are capable of rapidly renewing themselves and specializing into cell types with specific functions. This is called pluripotentiality, an ability demonstrated in 1998, when French doctors performed the first successful stem cell transplantation. Cord blood from a newborn was given to his five-year-old sibling suffering from severe anemia syndrome and skeletal defects. A 5-year-old boy was also treated in 2001 for thalassemia minor, the most common genetic disease in Singapore. He received umbilical cord blood from a non-relative with no signs of rejection, the Singapore Straits Times reported.

In the mid-90s, the National Heart, Lung, and Blood Institute of the National Institute of Health launched a long-term multimillion study using umbilical cord blood transplants from unrelated newborn donors to determine whether it is a safe and effective alternative to bone marrow transplantation (BMT) and treatment for pediatric and adult cancers, blood diseases and blood disorders.

Researchers are also investigating cord blood stem cells as a new approach to treating HIV- and AIDS – related illnesses. Currently, cord blood cells widest application is to repair bone marrow after it regenerates from aggressive chemotherapy or radiation.

Bloody good

The advantages of stem cell transplantation over bone marrow transplantation:

1. **Increased immune tolerance.** Stem cells can be transplanted into the donor, a relative, or a non-relative with lower risk of rejection. Because cord blood stem cells are "naive" and have a muted immune system, the risk of developing potentially fatal graft-versus-host is less in stem cell transplants than in BMT.
2. **Stem cells are easier to obtain.** Getting stem cells from bone marrow requires a major surgical procedure.
3. **More availability.** A matching procedure is necessary for BMT and may take six months or more if relatives are unavailable. A cord blood sample, on the other hand, can be collected, frozen, and available for treatment within two to four weeks. This can be especially useful for patients with severe cases of leukaemia or anaemia.
4. **Greater ability to regenerate blood cells.** Studies show that cord blood generates new blood cells faster than stem cells found in bone marrow. Ounce for ounce, there are nearly 10 times as many blood-producing cells in cord blood. This suggests that a smaller number of cord blood stem cells are needed for a successful transplantation.

Banking on Life

Storing umbilical cord blood and stem cells offers protection against debilitating disease, and some countries have the technology to help meet this promise. Some commercial blood banks in the U.S. and Europe already offer this service; Japan, China, Taiwan, Vietnam, South Korea, Malaysia, and Israel also have adequate facilities. In Singapore, two pioneering firms offering cord blood banking services are CordLife Pte Ltd and StemCord.

"The Singapore Ministry of Health provides policy and cord blood banking standards based on those set by the American Association of Blood Banking (AABB). CordLife is currently working directly with the AABB for the accreditation of its facilities in Singapore and to meet both local and international requirements of this service," says Steven Fang, CordLife founder and CEO.

Even if the science of stem cells has yet to reach perfection, knowledgeable individuals are keeping abreast. Dr. Steven Ang, a dentist from Singapore, is one of them.

Medical professionals have used hematopoietic stem cells (HSCs) taken from cord blood for over a decade to treat blood and metabolic disorders, cancers, and autoimmune diseases. "I first learned about cord blood storage when I was attending dental school in the U.K. from 1991 to 1996," says Ang. "When I returned to Singapore, I heard about CordLife from the National newspaper, the Straits Times."

"Worried that my offspring, particularly my daughter who was born in February, will inherit my family's inclination towards leukemia, my wife and I decided to store cord blood as a precautionary measure," says Ang. "We decided to do this to safeguard our own family (including my parents and in-laws) from any possible ailments."

When confronted with the possibility that cord blood may, in the future, be considered public property, Ang was deeply concerned. (Today's technology allows the collected blood to be used once.) "We wouldn't allow other patients to use it. It is simply too precious," he says. "It would defeat our purpose if we allowed the public to use it."

With an initial service fee of S\$4,500 and an annual storage cost of S\$300, patients may have the means to preserve their health with no risk to either newborn or mother. "My wife

and I feel that the pros – the health of our children, relatives, and even descendants – outweigh the cons,” he adds.

Issues

While cord blood banking offers so much, particularly for families with a history of genetic diseases, ethical and legal considerations have to be examined before it becomes routine. Jeffrey P. Kahn, M.D., director of the Center for Bioethics at the University of Minnesota, and the March of Dimes Foundation Birth Defects Foundation voices out some of these concerns:

1. Can science come up with a way to grow stem cell in culture?
2. Is stored blood personal property or community resource? Who determines this?
3. Can we afford disease screening for stem cell use?
4. Can confidentiality and privacy be guaranteed for donors and recipients of stem cells?
5. If it becomes a public resource, is informed consent necessary?
6. If it becomes a public resource, can a fair system of harvesting and accessing cord blood be created?

Answering these questions will help this infantile area of medicine through its growing pains.

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