Umbilical Cord Blood Banking

**ABSTRACT:** Two types of banks have emerged for the collection and storage of umbilical cord blood—public banks and private banks. Public banks promote allogenic (related or unrelated) donation, analogous to the current collection of whole blood units in the United States. Private banks were initially developed to store stem cells from umbilical cord blood for autologous use (taken from an individual for subsequent use by the same individual) by a child if the child develops disease later in life. If a patient requests information on umbilical cord blood banking, balanced and accurate information regarding the advantages and disadvantages of public versus private banking should be provided. The remote chance of an autologous unit of umbilical cord blood being used for a child or a family member (approximately 1 in 2,700 individuals) should be disclosed. The collection should not alter routine practice for the timing of umbilical cord clamping. Physicians or other professionals who recruit pregnant women and their families for for-profit umbilical cord blood banking should disclose any financial interests or other potential conflicts of interest.

**Introduction**

Once considered a waste product that was discarded with the placenta, umbilical cord blood is now known to contain potentially life-saving hematopoietic stem cells. When used in hematopoietic stem cell transplantation, umbilical cord blood offers several distinct advantages over bone marrow or peripheral stem cells. Biologically, a greater degree of human leukocyte antigen mismatch is tolerated by the recipient and the incidence of acute graft-versus-host reaction is decreased when umbilical cord blood is used (1, 2). The predominant disadvantage of umbilical cord blood use is related to the low number of stem cells acquired per unit. However, the use of combined units of umbilical cord blood allows for the expansion of umbilical cord blood volume (and increased number of stem cells) to be used for adult hematopoietic transplants. Studies are currently underway evaluating the feasibility of ex vivo expansion of the units (3, 4). Since the first successful umbilical cord blood transplant in 1988, it has been estimated that more than 7,000 transplants have been performed in children and adults for the correction of inborn errors of metabolism, hematopoietic malignancies, and genetic disorders of the blood and immune system (5).

Two types of banks have emerged for the collection and storage of umbilical cord blood—public banks and private banks. The first public bank was established at the New York Blood Center in 1991 and other public banks have since been established in various regions of the country. In 1999, the National Bone Marrow Donor Program established a network of these banks listing their units on the National Bone Marrow Donor Program Registry and established the Center for Cord Blood in 2005 (6). As part of this effort, specific subcommittees have been established to address issues related to umbilical cord blood banking, such as standards, quality improvement, donor recruitment, collection, testing, and processing methodology. In December 2005, federal legislation was enacted that provides funding for continued growth of a national umbilical cord blood registry in the United States through the C.W. Bill Young Cell Transplantation Act. Some states have passed legislation requiring physicians to inform their patients about umbilical cord blood banking options. Clinicians should consult their state medical associations for more information regarding state laws.
Public banks promote allogenic (related or unrelated) donation, analogous to the current collection of whole blood units in the United States. These banks typically are associated with a local network of obstetric hospitals that send their units of blood to a central processing facility. A minority of public banks will accept units from any provider through shipment by an overnight express courier (7). Units of umbilical cord blood collected for public banks must meet rigorous standards of donor screening and infectious disease testing as outlined by the U.S. Food and Drug Administration. Initial human leukocyte antigen typing of these units allows them to be entered into computerized registries so that when the need arises, a specific unit can be rapidly located for a patient. Private banks were initially developed to store stem cells from umbilical cord blood for autologous use (taken from an individual for subsequent use by the same individual) by a child if the child develops disease later in life. There is a cost associated with the initial specimen processing and an annual storage fee for for-profit umbilical cord blood banks (8).

The utility of long-term storage of autologous umbilical cord blood has been questioned. There is no accurate estimate of an individual’s likelihood of using an autologous unit of umbilical cord blood. One estimate is approximately 1 in 2,700 individuals, whereas others argue that the rate would be even lower (9). Stem cells obtained from banked umbilical cord blood cannot currently be used to treat inborn errors of metabolism or other genetic diseases in the same individual from whom they were collected because the genetic mutation would already be present in the stem cells. Autologous umbilical cord blood is not used as a source of stem cells to treat childhood leukemia because chromosomal translocations in fetal blood have been detected in some children who ultimately develop leukemia (10, 11). In addition, the use of autologous stem cells would negate the beneficial graft-versus-leukemic effect that occurs with allogenic stem cell transplants (9).

**Recommendations and Conclusions**

- If a patient requests information on umbilical cord banking, balanced and accurate information regarding the advantages and disadvantages of public versus private umbilical cord blood banking should be provided. The remote chance of an autologous unit being used for a child or a family member (approximately 1 in 2,700 individuals) should be disclosed.
- Discussion may include information regarding maternal infectious disease and genetic testing, the ultimate outcome of use of poor quality units of umbilical cord blood, and a disclosure that demographic data will be maintained on the patient.
- Some states have passed legislation requiring physicians to inform their patients about umbilical cord blood banking options. Clinicians should consult their state medical associations for more information regarding state laws.
- Directed donation of umbilical cord blood should be considered when there is a specific diagnosis of a disease known to be treatable by hematopoietic transplant for an immediate family member.
- Obstetric providers are not obligated to obtain consent for private umbilical cord blood banking.
- The collection should not alter routine practice for the timing of umbilical cord clamping.
- Physicians or other professionals who recruit pregnant women and their families for for-profit umbilical cord blood banking should disclose any financial interests or other potential conflicts of interest.

**References**


Additional Resources

National Marrow Donor Program
3001 Broadway Street, NE
Minneapolis, MN 55413
612-627-5000 or 1-800-627-7692
http://www.marrow.org

http://parentsguidecordblood.org

American Academy of Pediatrics
141 Northwest Point Boulevard.
Elk Grove Village, IL 60007
847-434-4000
http://www.aap.org

American Association of Blood Banks
8101 Glenbrook Road
Bethesda, MD 20814
301-907-6977
http://www.aabb.org