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TRANSPLANTING UMBILICAL CORD BLOOD STEM CELLS EXPLORED AS ALTERNATIVE TO BONE MARROW TRANSPLANTS

DALLAS -- September 7, 1994 -- Cancer patients and their families, especially the parents of young children with cancer, look at every possible treatment option in hope of finding a cure. Transplanting umbilical cord blood stem cells, a treatment being explored at The University of Texas Southwestern Medical Center at Dallas by pediatrician Dr. Eric Sandler, could give some of them an opportunity for a cure.

Sandler and Dr. Mahmoud Mustafa, both assistant professors of pediatrics, have established the Umbilical Stem Cell Project to procure, test and store human umbilical cord and placental blood for use as an alternative to bone marrow transplants. Cord blood may be used when the patient does not have a brother or sister with a compatible bone marrow type. Blood collection is under way, and Sandler hopes to perform the first transplant later this year. The project received initial funding from the 1994 American Cancer Society Cattle Baron's Ball in a grant to Children's Medical Center of Dallas. The blood will be stored at UT Southwestern's Transplant Services Center.

"Bone marrow transplants offer the only chance of cure for many children and adults with cancer, as well as for those with a variety of blood disorders," Sandler said. The problem, he explained, is that only about 25 percent of patients needing a transplant have a family member who is a compatible donor. If there is no compatible donor in the family, it is often difficult to identify an unrelated donor.

In a number of cases, umbilical cord blood stem cells could be

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transplanted instead of bone marrow, Sandler said. Approximately 2 ounces of placental blood contains more stem cells than a pint of bone marrow. The advantages of placental blood over bone marrow are obvious, he said. "This is a safe, potentially less expensive and perhaps lifesaving alternative to the use of unrelated bone marrow donors."

About 40 successful umbilical cord blood transplants have been performed around the world. The stem cell project is part of the growing pediatric bone marrow transplant program at UT Southwestern and Children's.

The umbilical cord blood will be collected primarily from babies delivered at Parkland Memorial Hospital, the primary teaching hospital for UT Southwestern. Approximately 14,000 babies are delivered each year at Parkland. With the mother's permission, the blood is harvested within minutes of birth without harm to the mother or child, Sandler said. A needle is inserted into the umbilical cord after the baby and placenta are delivered. The procedure poses no risk because the cord is already separated from them. The blood flows into a special collection bag and a mixture is added to freeze the blood whole.

The blood is then tested for infection or disease and typed. The stored blood is recorded in the stem cell registry and made available for use. Sandler said the data from the research at UT Southwestern will be shared with the New York Blood Center, one of only a few facilities in the United States currently collecting and storing cord blood for transplantation.

An initial research project, Sandler said, is to find a way to separate the portion of the cord blood containing the stem cells from the rest of the

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blood. The stem cells make the cord blood appropriate for transplantation as an alternative to bone marrow. Separating the blood would reduce the amount of space needed to store the collected frozen blood and make it possible to give patients only the blood containing the stem cells.

The stem cells found in newborn cord blood may provide a better match for transplant patients than bone marrow from unrelated donors, Sandler said. Banking the blood also makes it more immediately accessible to patients in need. On average, it takes four months to identify an unrelated, matched bone marrow donor for a cancer patient. "Unfortunately, many of our patients relapse while they're waiting for a donor," Sandler said.

Matching the bone marrow according to the donor's human leukocyte antigens (HLA) type increases the probability that the patient's body will accept the donated bone marrow. The HLA types must also be matched before the cord blood is used for a transplant. HLA is an inherited marker on the white blood cells. "People don't have to be siblings to share an HLA type," Sandler explained. "There are literally hundreds of HLA types. Having a large quantity of cord blood units available gives us a better chance of finding a compatible donor for a patient and could significantly increase the number of candidates for bone marrow transplants."

As the cord blood is administered to the patient intravenously, "these stem cells find their way back to the bone-marrow spaces and start producing the necessary blood components. Nobody knows the exact mechanism or why they do it, but these stem cells know where they want to go," Sandler said.

One goal of the project is to set aside about one-third of the stored

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cord blood for research at UT Southwestern. Sandler said the project maximizes collaboration among a number of departments. "Transplant services is processing the blood; obstetrics and gynecology has agreed to let us work with them in the labor and delivery suite; Dr. Peter Stastny's (professor of internal medicine) tissue immunology lab will do the HLA typing to help us match recipients with the collected blood; and Dr. Louis Picker (assistant professor of pathology) in cellular immunology will be doing studies to examine the different types of immune cells found in cord blood."

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