Cell Recovery Following Implementation of an Automated Cord Blood Processing System in a High Volume Laboratory

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BACKGROUND:

Many cord blood (CB) processing facilities are transitioning to automated systems to standardize methods and decrease human error. The AutoXpress Platform™ (AXP™) is an automated, functionally-closed, sterile CB processing system. When placed within the AXP device and centrifuged, the whole blood product is separated into its composite cell populations and the total nucleated cell (TNC) fraction of the CB unit is separated and automatically delivered into a seamless blow-molded freezing bag at a uniform volume of 21 mL.

OBJECTIVE:

This study evaluated the use of the AXP system in a family cord blood bank, targeting at producing consistently high TNC and mononuclear cell (MNC) recovery rates in a broad range of collection volumes.

METHODS:

Cord blood units were collected between 12/5/2006 and 2/24/2007 from 1414 consenting mothers who elected to preserve and bank CB at Cord Blood Registry (CBR). Collection kits were provided at the time of enrollment. After delivery, CB was collected from the umbilical cord and transported to CBR’s processing facility in Tucson, Arizona. During the study period, all units arriving at the CBR laboratory were allocated to either Ficoll or AXP processing based on the volume, age, and the degree of clotting in each unit. Units processed using AXP had a volume of 40-130 mL, an age of less than 48 hours since collection, and a clotting score of 0 to 2+ (based on an internal scale). TNC and MNC counts were measured both pre- and post-processing, using a Sysmex (Mundelein, IL) hematology analyzer.

RESULTS:

- The mean age of cord blood units arriving at the laboratory was 23.6 hours
- The mean collection volume was 72.9 mL
- The mean TNC count post-processing was 9.94x10^8
- The mean TNC percent recovery was 96.2%
- The mean MNC percent recovery was 98.7%

CONCLUSIONS:

AXP automated cord blood processing provides consistently high TNC and MNC recovery rates, which has important implications for stem cell dose if the sample is used in transplant. Because limited cell dose is frequently cited as an obstacle to CB transplantation, processing results could impact the usability of each unit. Because family CB banks process all units, regardless of collection volume, percent recovery becomes particularly important in evaluating the differences between processing centers. The AXP system yields the highest published cell recovery rate and can be easily integrated into a CB processing center such that it decreases the labor and time required for processing while maintaining MNC recovery of greater than 98%.