Table 3. *Interaction between HLA Mismatches, Number of Cells and Outcomes in Unrelated Cord Blood Transplants for Non-Malignant Diseases*

	Number of HLA MM 0-1 vs 2 vs 3-4	Type of HLA MM Class I vs II	Interaction with Number of Cells
PMN engraftment	Less	More 2 DRB1 =	Less <cells and >MM
Platelet engraftment	Less	More 2 DRB1 =	Less <cells and >MM
TRM	More	Less 2 DRB1 =	Less <cells and >MM
AGVHD	More	Same	More >cells and >MM
CGVHD	More	Same	More >cells and >MM
LFS, OS	Less	Better 2 DRB1 =	Worse if HLA MM >2 and NC <3.5 NC/kg

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UMBILICAL CORD BLOOD TRANSPLANTATION FOR TRANSFUSION-DEPENDENT THALASSEMIA AND SICKLE CELL DISEASE

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Sickle cell anemia and β-thalassemia major are clinically significant hereditary anemias that elicit world-wide attention due to the frequency and severity of these disorders. Historically, most children who inherited these disorders died in the first decade of life. In the contemporary era, however, supportive care has extended lifespan through the 5th decade of life and beyond, with survival through early adulthood now indistinguishable from those unaffected by these disorders. As a result, chronic health impairments that significantly reduce the quality of life have become the principal challenge in β-thalassemia major and sickle cell anemia. Thus, the application of hematopoietic cell transplantation and its inherent risk of mortality in the short-term must be balanced by the benefit of survival without the burden of chronic illness in the long-term. Toward this end, the development of umbilical cord blood transplantation (UCBT) represents a significant advance due to its association with a lower risk of graft-versus-host disease (GVHD), the leading cause of mortality and morbidity after HCT for hemoglobinopathies. We have observed outcomes after UCBT that are identical to earlier results of bone marrow transplantation for hemoglobinopathies. In our multi-center series of patients treated by HLA-identical sibling UCBT, 26 of 29 (90%) survive, and 25 (86%) survive disease-free. Overall, the Kaplan-Meier probabilities of survival and event-free survival after sibling UCBT are 89% and 86%, respectively with a median follow-up of 1.3 (range, 0.1-7.6) years. The cumulative incidence of graft failure was 4%. Results after unrelated donor UCBT remain limited, but suggest encouraging results, particularly with regard to the rates of acute and chronic GVHD. UCBT in lieu of more conventional sources of hematopoietic cells may be particularly advantageous when there is urgency for transplantation and in non-malignant disorders where GVHD, in particular, has a negative impact upon outcome.

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UNRELATED CORD BLOOD TRANSPLANTATION (CBT) FOR HEMOGLOBINOPATHY

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Unrelated umbilical cord blood transplantation (CBT) is a potentially curative therapy for most hemoglobinopathy patients; however, cell dosage is a critical factor for CBT. We previously showed that by combining strategies that maximize cell dose, that is, non-red cell reduced plasma depleted cord blood (PD CB), forego post-thaw wash, and double cord blood transplantation when needed—promising results may be achieved with unrelated CBT in selected patients (Jaing et al, *BBMT* 2005;11:349). Between July 1991 and April 2006, 45 unrelated CBT were performed after myeloablative therapy in 38 pediatric patients with transfusion-dependent hemoglobinopathy (36 thalassemia and 2 SCD) at the authors' institutions and 11 other centers using mostly PDCB units that were not washed after thawing (6 double cords and 1 re-transplant). Nineteen patients were Pesaro class 1, four class 2, and one class 3, with 14 status unknown. The median age of patients was 6 years old (range 0.3-20 yr) with a median weight of 19 kg (range 8-76 kg). All PD CB data were audited internally and externally and the primary data for the 15 patients at Chang Gung were audited by one of the authors (JR).

No significant adverse events were observed after direct infusion despite major ABO incompatibility in 9 cases.

Unadjusted ANC 500 and platelet 20,000 engraftment cumulative incidence with donor chimerism was achieved in 81 ± 7% and 79 ± 8% of the cases, and median times to ANC500 engraftment, and platelet 20,000 engraftment were 17 (range 11-33 days) and 37 (range 16-133 days) days after transplantation, respectively (Table 4).

Eight patients died with 3 deaths unrelated to the CBU (2 early deaths prior to day 20 and one accident). All remaining 30 patients

Table 4. *Summary of Clinical Outcome Based on Experience and Washing*

	Autologous Recovery	1 Yr. OS	1 Yr. DFS	Unadjusted Cumulative Incidence ANC500	Plt20K	Plt50K	III-IV aGVHD	Extensive cGVHD
Less experienced	15%	63%	45%	71%	56%	56%	0%	0%
Experienced	11%	87%	77%	87%	86%	86%	16%	10%
Not Washed	12%	83%	72%	83%	86%	82%	13%	8%
Washed	17%	55%	26%	70%	40%	40%	0%	0%
Overall	13 ± 6%	77 ± 7%	65 ± 8%	81 ± 7%	79 ± 8%	76 ± 8%	11%	6%

Table 5. *Summary of Graft Parameters Based on Experience and Washing*

	Patients, n	CBU, n	HLA Matches, n	Prefreeze TNC Dose	Post-thaw TNC Dose	TNC Recovery	Prefreeze $CD34^+$ Dose	Post-thaw $CD34^+$ Dose	$CD34^+$ Cell Recovery
Less experienced	15	15	5.0	6.8	2.6	83%	3.6	1.1	39%
Experienced	23	30	4.0	8.9	6.6	89%	3.4	3.3	99%
Not washed	31	38	4.0	9.1	5.6	81%	3.5	2.9	83%
Washed	7	7	5.0	6.4	2.1	NA	3.9	3.1	NA
Overall	38	45	4.0	8.1	5.6	82%	3.4	2.9	84%