



Umbilical Cord Blood (UCB) Transplantation

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Goal:

- The goal of the Israeli National Cord Blood Bank at MDA is to collect, process and freeze CB samples for future transplant to Jews and other **minority-group members** throughout the world.

Selection and transplant of UCB:

- Candidates for UCB stem cell transplants are patients with malignant and hereditary diseases who do not have a potential sibling donor.
- Roughly 2/3 of patients have advanced disease, about 1/3 have failed a previous Bone marrow (BM)/Peripheral Blood Stem Cell (PBSC) transplant, which puts them at an even higher risk for morbidity and mortality.
- So far, more than 2/3 of the 3500 UCB transplants performed to date have been done in children. This is due to the small number of cells in one UCB unit. which may preclude transplants to adults.
- However, recently a growing experience has been described with transplantation of adults, using **two** units of UCB, thus shortening the delay in engraftment and potentially allowing many more adults to benefit from UCB.

Cord Blood Banking:

- To date, approximately 180 000 units of UCB have been collected and stored in Europe, Japan and the United States. Since **minority groups are insufficiently represented** in adult bone marrow registries, it is the goal of UCB bankers to provide a source for transplants to members of **minority groups**.
- Members of the Jewish community, irrespective of their place of birth, make up a minority group with distinct HLA specifics. Moreover, other minority groups within Israel, whose genetic typing has not been fully mapped, are even less well represented.
- CB banks outside of Israel seek to enlarge their local minority representation, such as Afro-American, Hispanic etc. **ICBB** is the sole UCB bank that can and will collect **Israeli samples** that will reflect the population of Israel.



Comparison of BM/PBSC and UCB:

The table below summarizes information on BM/PBSC vs. UCB and depicts data on the search, minority representation, quality of the products and results of actual transplants.

It must be mentioned that although UCB transplantation to date has not been the preferred choice by many transplant specialists, new data from leading groups seem promising for **adults**: the feasibility of using **more than one** unit of UCB has been shown and the results are no worse than with PBSC. This, together with the fact that UCB allows a greater permissiveness in HLA matching, may lead to many more adult transplantations in the very near future⁷⁻⁹.

Table 1: Differences between Bone Marrow (BBM)/Peripheral Blood Stem Cells (PBSC) and Umbilical Cord Blood (UCB). §Based on data from ¹⁻⁶

Parameter Examined	BM/PBSC	UCB
Information of A+B+DRB1 (DNA) typed	16-56	50-80
Median search time (m)	4-6	<1
Donors identified but not available (%)	30	<1
Rare haplotypes represented* (%)	2	30
Major limitations of graft acquisition	HLA match	Cell Dose
Ease of arranging date of cell infusion	Difficult	Easy
Potential for viral transmission	Yes CMV>50%	No CMV<1%
Risk to donor	Yes	No
# Nucleated Cells (x10 ⁸ /Kg)	2-9	0.17
# CD34 ⁺ Cells (x10 ⁶ /Kg)	3-8	0.12
Degree of Donor-Recipient HLA Match	90% 6/6	85% <5/6
Median Days to Engraftment	<14	30 (23 if 2 units)
Acute GVHD Grade III-IV	~33**	17-37**
Chronic GVHD Grade III-IV	~33**	25
Overall Survival @ 5 year***	~40	30-60**

§Based on data from ¹⁻⁶

*i.e. minorities.

**Note HLA disparity

***Varies by disease type and severity.



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