Peripheral **H**ematopoietics **S**tem **C**ells **C**ollection by **L**arge **V**olume **L**eukapheresis (**LVL**) in **C**hildren

HSCT unit - Children's Hospital – Damascus - Syria

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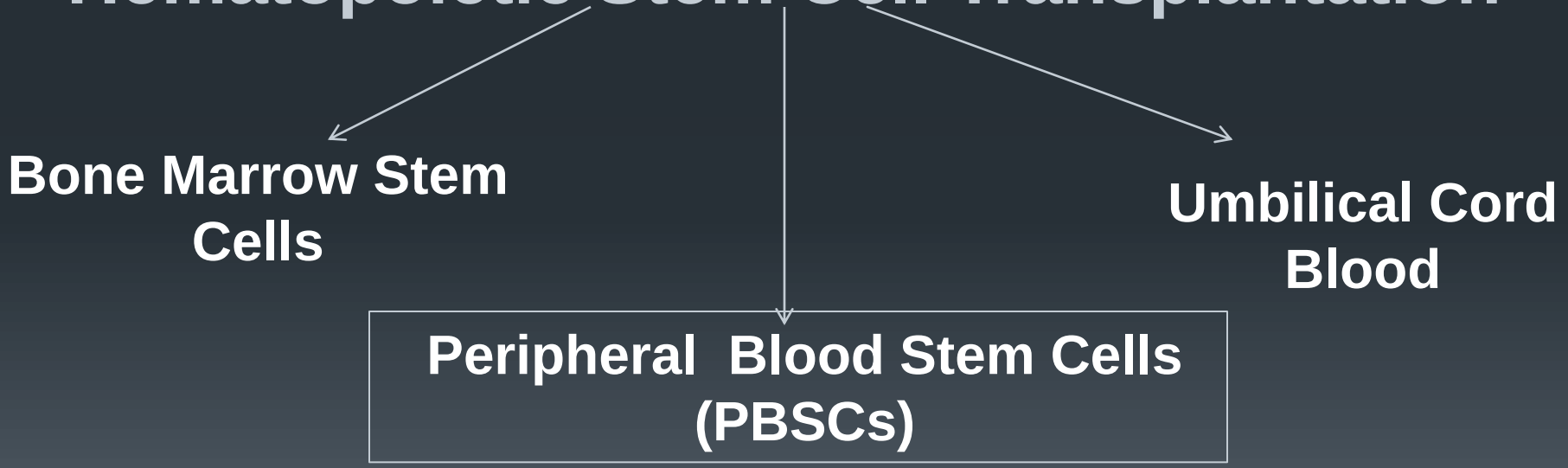
Hematopoietic Stem Cell Transplantation Terminlogy

~~Bone Marrow Transplantation~~

Hematopoietic Stem Cell Transplantation



Background

Peripheral blood progenitor cells (PBPCs) have become the preferred source of stem cells for autologous transplantation because of:

- Easier accessibility
- Rapid engraftment

Background

- Experience with PBPCs collection in children, specially in very small ones, is still limited because of potential problems which are specific to children:
  - Vascular access difficulties
  - Low total blood volume (TBV)
  - Long duration of procedure: sedation?

Large Volume Leukapheresis (LVL)

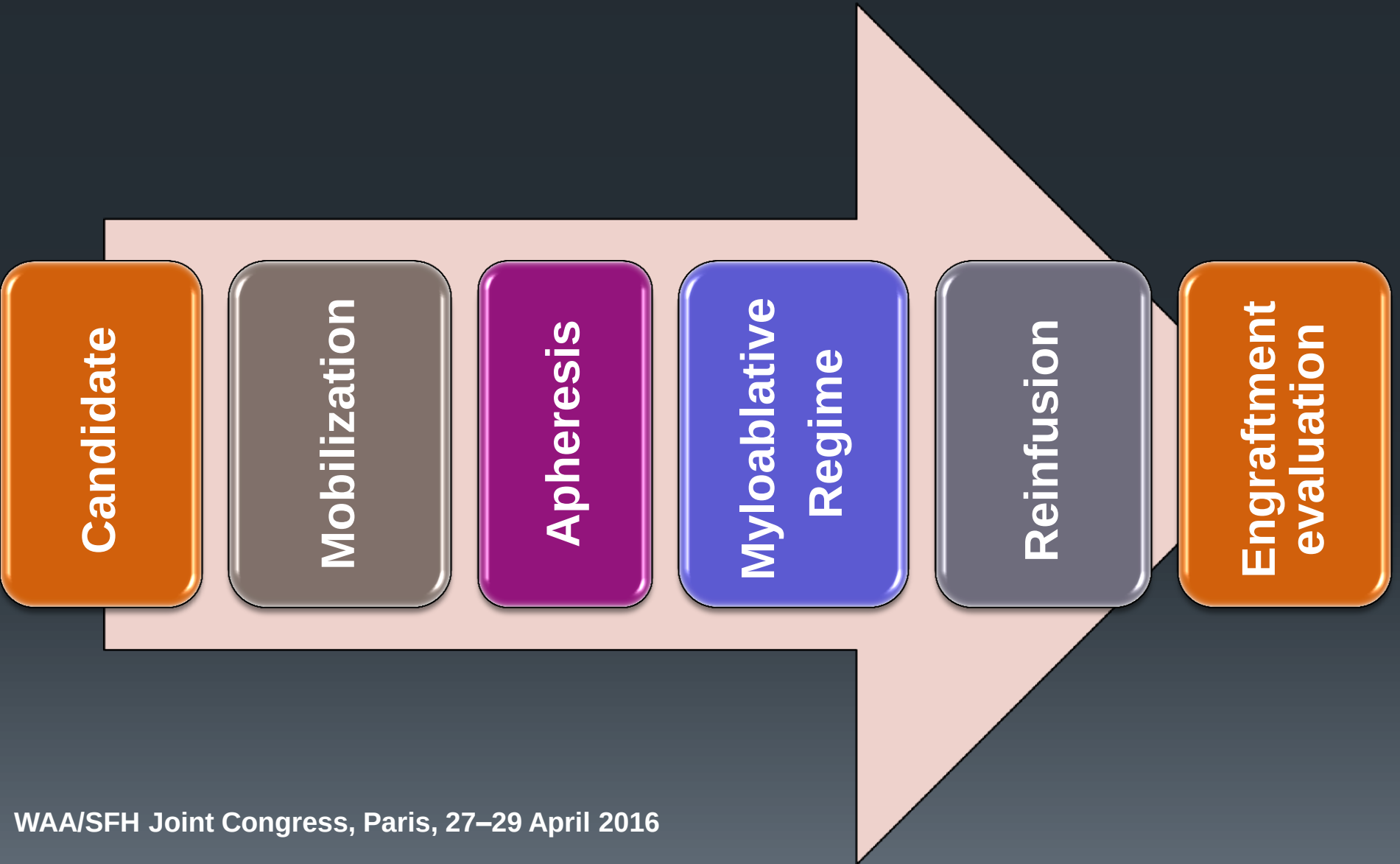
- In large volume leukapheresis (LVL) three or more blood volumes are processed in the same procedure.

- LVL is warranted in pediatric patients to decrease the number of procedures and potentially decrease tumor contamination

Aim of the study

Evaluation the efficiency and safety of the PBSCs collection by LVL in children for auto-transplantation

Process of **HSC** Auto-Transplantation



Materials and Methods

Sep 2014 - April 2016
HSC unit Children" Hospital - Damascus University - Syria

Patients ' Characteristics		
N. patients (M/F)		**7 (4/3)**
Mean Age (year)		**6.1 (4.4-9)**
Mean Weight (kg)		**18.5 (14-25)**
Diagnosis	**N.B IV / NHL**	**6/ 1**
CV catheter	**Femoral / Subclavian**	**6 / 1**

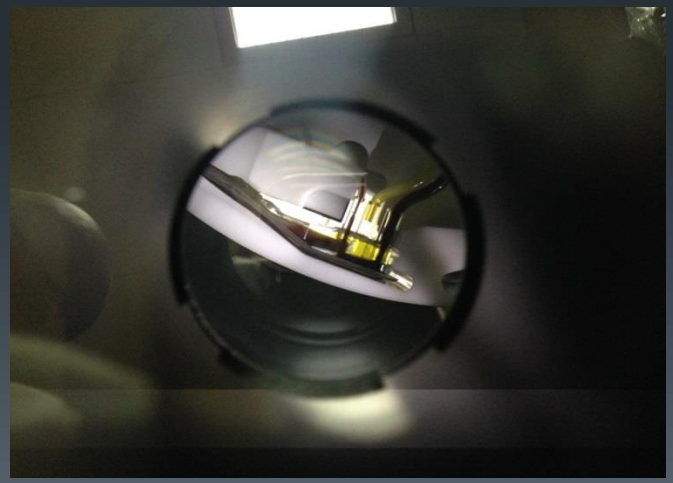
Mobilisation

- Mobilization with GCS-F (10 µg/ kg for 3 days and 10 µg/ kg x2 the 4th day)
- The collection was performed at day 5
- Blood counts daily

Leukapheresis

- Spectra Optia MNC v.3.4,(Cardian BCT) was used with automatic interface management (AIM)
- Anticoagulant: acid citrate dextrose ACD-A + heparin(3000 u in 500 ml)
- AC infusion rate (ml/min/l TBV)= 08-1.2
- Inlet :AC ratio 1/30
- Priming with ABO RhD compatible, Phynotyped, irradiated, and leuko- filtrated RBC was necessary for 2 patients (28.5%)
- Monitoring continuously of vital signs, EKG and O2 saturation
- No sedation was needed

PBSC Collection Unit



PBSC Collection Unit

PBSCs Collection Targets

- Apheresis goals were the same in all children : to collect a dose of at least 2.5 x 10^6 CD34+ cells/kg body Weight.

Yield Calculation

- Complete blood counts of the PBSCs harvest using a hematology analyzer
- Cell Viability assessment
- CD34+ count was done by FACscalibur according to ISCHAGE protocol using BD reagents.

Results-LVL Procedures

	Mean	Min	Max
Age (Years)	6.1	4.4	9
Weight (kg)	18.5	14	25
N. Apheresis	1	1	1
TBV (ml)	1470	1120	1976
Whole blood processed (ml)	4938	3985	5863
Blood volume processed (ml/kg)	270	223	318
No of TBV processed	3	3	4
ACD used to patient	234	137	379
Collected Volume(ml)	128	77	179
Time(min)	222	181	285

The Harvesting Day

CBC & $CD34^+$ Count		Mean	Min	Max
Peripheral Blood	WBC ($x10^9$/L)	35.5	8.1	55
	Hct (%)	34	28	40
	MNC ($x10^9$/L)	4.6	0.8	8.2
	Plt ($x10^9$/L)	197	116	333
	CD34+ /µL	168.8	53	300

Apheresis Product

CBC & CD34+ Count	Mean	Min	Max
WBC($x10^9$/L)	118	27.2	210
MNC ($x10^9$/L)	77.4	9.9	146
Hb (g/dl)	0.6	0.13	1.2
Plt ($x10^9$/L)	1155	800	1872
CD34+ (/µL)	1295.9	640	2390

$CD34^+$ Yeild

CBC & CD34+ Count	Mean	Min	Max
Yield of MNC ($x10^8$/ kg)	4.79	0.65	4.89
Yield of $CD34^+$ cell ($x10^6$/ kg)	8.8	4.57	14.79

Engraftment Kinetics

	Median (Day)	Min	Max
P.N> $0.5x10^9/L$	10.7	8	14
Plt> $20x10^9/L$	15.1	11	18

Blood Transfusion Need

Blood Component	Mean	Min	Max
N. of RBC transfusion	1.1	1	2
N. of CPA Transfusion	4.9	3	7

Complication

- No complication was observed during the collection sessions
- Mean platelet loss was 50%, but platelet transfusion was not required in any patient

$x10^9/l$	Mean	Min	Max
Plt before	197.1	116	333
Plt after	96.4	55	144
Plt in collection bag	1155	800	1872
Collection Volume	128	77	179
Collection phase N	7	4	9
Plt loss	50%	37.8%	64%

Results Of Our Experiences

Conclusion

- PHSC collection using apheresis is a safe and convenient procedure that can be carried out in children with relative ease

- We achieved the desired yield of **CD34+ >4x10^{6}/kg** in all patients by **one apheresis** procedure using large volume :
  - economical, psychological effects