Simpósio Satélite

NUEVOS ENFOQUES EN MOVILIZACIÓN DE
PROGENITORES HEMATOPOYÉTICOS Y TRATAMIENTO DE PTTA

PBSC MOBILIZATION STRATEGIES. CAN WE FURTHER OPTIMIZE OUR PROTOCOLS?

Carlos Vallejo

Hospital Clínico Universitario de Santiago

33 CONGRESO SOCIEDAD ESPAÑOLA DE TRANSFUSIÓN SANGUÍNEA Y TERAPIA CELULAR

SETS

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PBSC MOBILIZATION STRATEGIES. CAN WE FURTHER OPTIMIZE OUR PROTOCOLS?

- Introduction - Why should we optimize our protocols?
- Mobilization strategies
- Consensus and protocols
- Take-home messages

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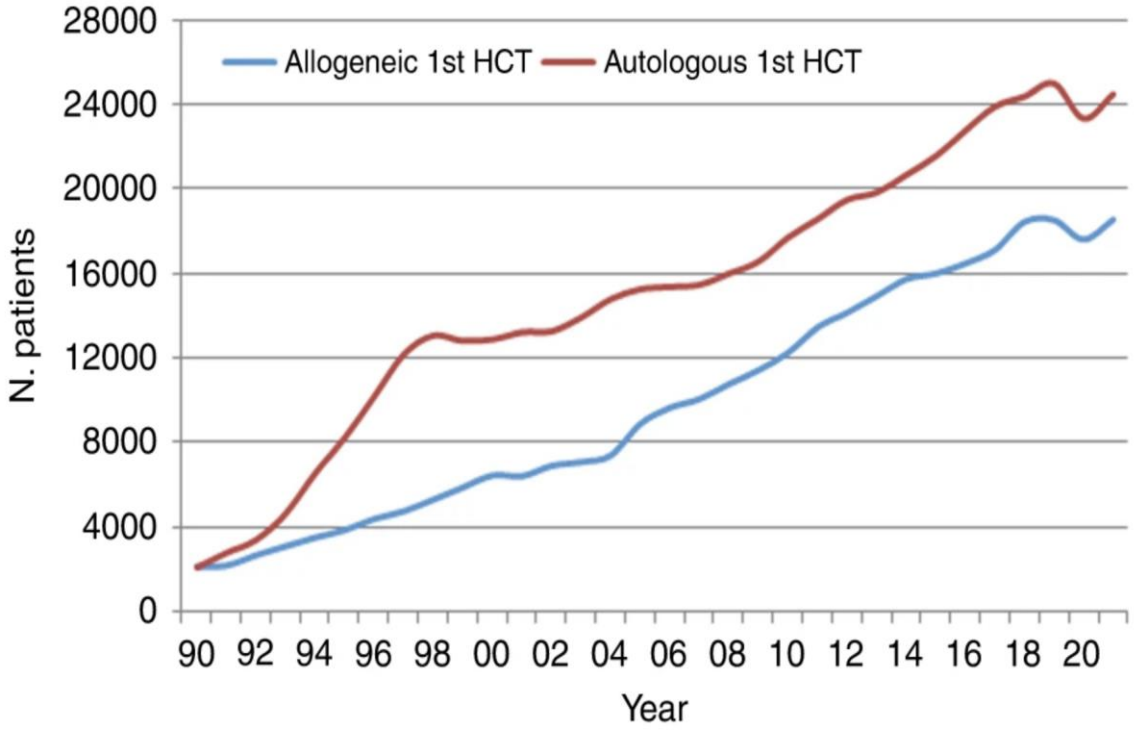
Why should we optimize our protocols?

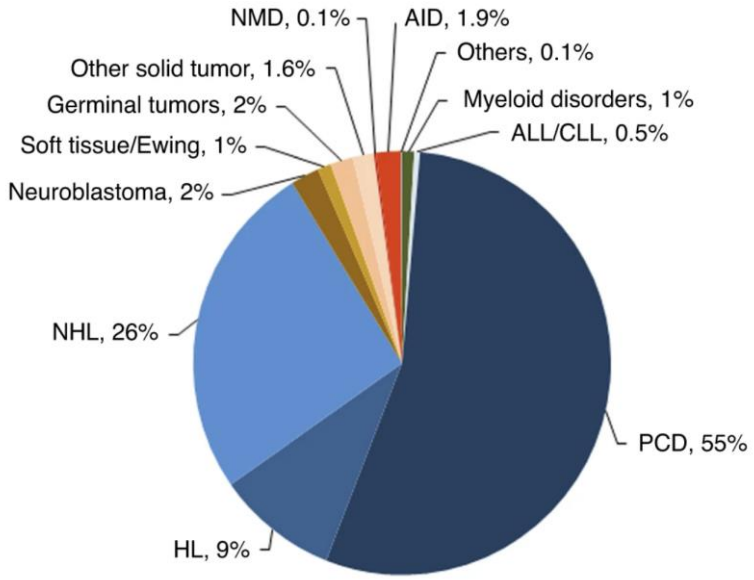
1. Increased activity → need to be more **efficient**

Increased activity

N = 27,606

Activity (EBMT)





Passweg JR, et al. Hematopoietic cell transplantation and cellular therapies in Europe 2021. The second year of the SARS-CoV-2 pandemic. A Report from the EBMT Activity Survey. *Bone Marrow Transplant*. 2023;58(6):647-658. doi:10.1038/s41409-023-01943-3

Increased activity

N = 2,259

Activity (ONT)

TABLA V. INDICACIONES DE TRASPLANTES DE PROGENITORES HEMATOPOYÉTICOS POR TIPO 2022

			AUTÓLOGO		ALOGÉNICO		TOTAL	
			N	%	N	%	N	%
N = 46 (2.0%)	LEUCEMIAS, SMD y NMP	LMA 1ª RC	35	14,9	309	85,1	344	9,5
		LMA no 1ª RC	4	5,2	133	94,8	137	3,8
		LLA 1ª RC	3	3,5	152	96,5	155	4,3
		LLA no 1ª RC			116	100,0	116	3,2
		LMC 1ª FC	2	8,3	12	91,7	14	0,4
		LMC no 1ª FC			15	100,0	15	0,4
		SMD o MD/MP	1	0,9	236	99,1	237	6,5
		NMP	1	2,4	59	97,6	60	1,7
N = 1307 (57.9%)	DISCRASIAS DE CELULAS PLASMATICAS	MM	1232	85,5	15	14,5	1247	34,4
		Otras DCP	75	87,5	6	12,5	81	2,2
N = 761 (33.7%)	ENF. LINFOPROLIFERATIVAS	L. Hodgkin	164	63,1	55	36,9	219	6,0
		L. No Hodgkin	595	50,4	107	49,6	702	19,3
		LLC (inc.LPC)	2	11,8	16	88,2	18	0,5
N = 122 (5.4%)	TUMORES	Neuroblastoma	34	100,0			34	0,9
		Tejidos blandos	2	100,0			2	0,1
		T. Germinales	58	100,0			58	1,6
		T. Ewing	8	100,0			8	0,2
		Otros TS	20	83,3	2	16,7	22	0,6
	INSUFICIENCIAS MEDULARES	AMG			60	100,0	60	1,7
		Otras IM			12	100,0	12	0,3
N = 18 (0.8%)	ENF. NO MALIGNAS	Talasemia			8	100,0	8	0,2
		Otras Hemoglob.			9	100,0	9	0,2
		Inmunodef. prim.			26	100,0	26	0,7
		Enf. Metabólicas			3	100,0	3	0,1
N = 5 (0.2%)		E. Autoinmunes	18	100,0			18	0,5
	OTROS	Otras	5	23,5	20	76,5	25	0,7
	TOTAL		2259	62,2	1371	37,8	3630	100,0

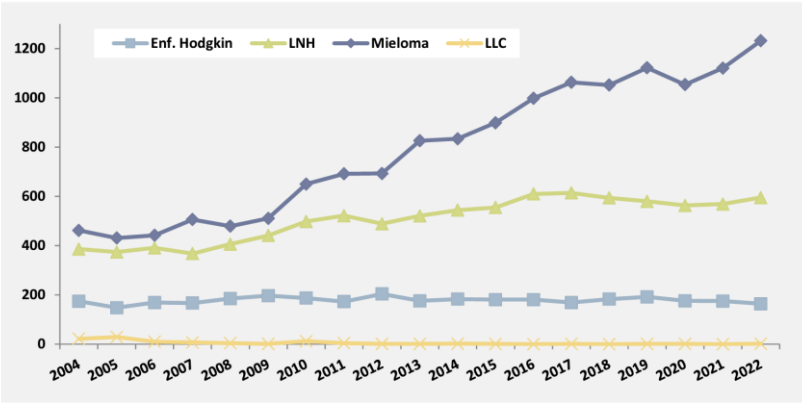


Fig. 11. TPH Autólogos en síndromes linfoproliferativos. 2004-2022

+ allo-HSCT, CAR-T, ECP,…

ONT activity 2022. Disponible en: https://www.ont.es/informacion-a-los-profesionales-4/actividad-de-donacion-y-trasplante-4-5/

Why should we optimize our protocols?

1. Increased activity → need to be more **efficient**

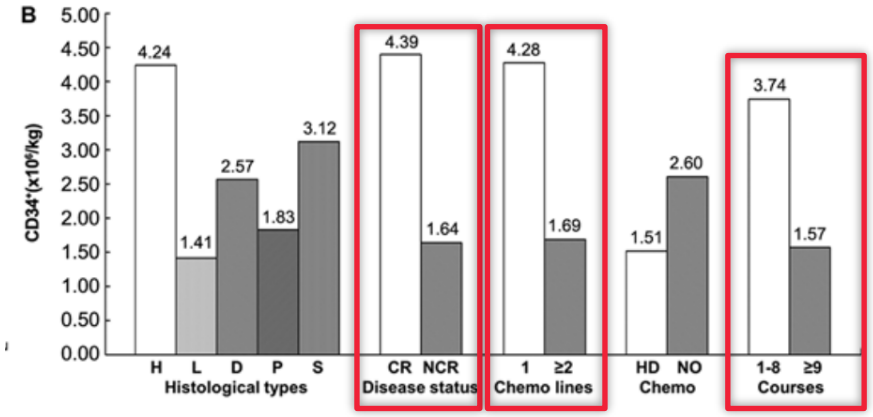
2. "Traditional and new" poor mobilization **risk factors/predictors**

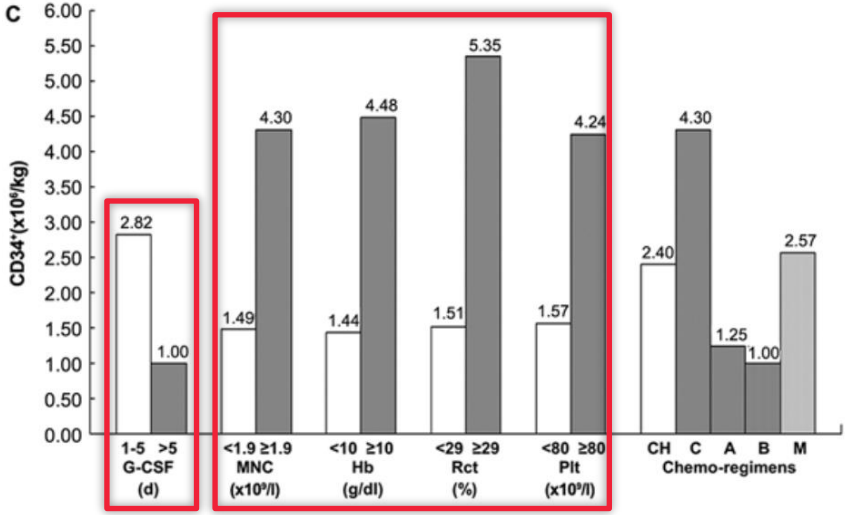
Poor Mx: risk factors/predictors

Table II. Baseline characteristics of patients with lymphoma and the outcome of stem cell mobilization.

Patient characteristics	Patients, n (%)	Mobilization, n (%)		P-value
		Success	Failure	
Number	75 (100)	44 (59)	31 (41)	
Age, years[a]	38 (16-61)	37.5 (17-57)	39 (16-61)	0.477
Sex[b]				0.699
Male	44 (59)	25 (57)	19 (61)	
Female	31 (41)	19 (43)	12 (39)	
Histopathology (WHO)[c]				0.297
Hodgkin lymphoma	7 (9)	6 (14)	1 (3)	
Lymphoblast lymphoma	15 (20)	5 (11)	10 (32)	
DLBCL	31 (42)	20 (45)	11 (36)	
PTCL	15 (20)	7 (16)	8 (26)	
Small B lymphoma	7 (9)	6 (14)	1 (3)	
Status of disease[b]				0.009
CR	40 (53)	29 (66)	11 (35)	
Not CR	35 (47)	15 (34)	20 (65)	
Number of prior treatments lines[b]				0.046
1	44 (59)	30 (68)	14 (45)	
≥2	31 (41)	14 (32)	17 (55)	
High dose MTX/Ara-c[b]				0.026
Yes	17 (23)	6 (14)	11 (35)	
No	58 (77)	38 (86)	20 (65)	
Treatment courses[b]				0.012
1-8	53 (71)	36 (82)	17 (55)	
≥9	22 (29)	8 (18)	14 (45)	
Separation times[b]				1.000
2	71 (95)	42 (95)	29 (94)	
>2	4 (5)	2 (5)	2 (6)	
G-CSF duration (d)[b]				0.001
1-5	60 (80)	41 (93)	19 (61)	
>5	15 (20)	3 (7)	12 (39)	
Hematological values				
B-MNC (x10^9/l)[a]	1.9 (0.1-7.9)	2.4 (0.6-7.9)	1.4 (0.1-3.0)	<0.001
Hb (g/l)[a]	98.3 (66-135)	106.8 (68-135)	91.5 (66-116)	<0.001
Rct (%)[a]	28.7 (19.5-39.9)	31.6 (20.7-39.9)	26.8 (19.5-34)	<0.001
Plt (x10^9/l)[a]	76.5 (19-250)	109.5 (25-250)	53 (19-176.5)	0.001
Treatment regimes[c]				0.052
CHOP like	33 (44)	21 (47)	12 (39)	
CTX	17 (23)	12 (27)	5 (16)	
HyperCVAD part A	9 (12)	3 (7)	6 (19)	
HyperCVAD part B	9 (12)	2 (5)	7 (23)	
MINE	7 (9)	6 (14)	1 (3)	

[a]Mann-Whitney U test (median value); [b]χ^2 test; test; [c]Kruskal-Wallis test. DLBCL, diffuse large B-cell lymphoma; PTCL, peripheral T-cell lymphoma; CR, complete response; MTX/Ara-c, methotrexate/cytarabine; G-CSF, granulocyte-colony stimulating factor; B-MNC, blood mononuclear cell; Hb, hemoglobin; Rct, reticulocyte; Plt, platelet; *CHOP*, cyclophosphamide, epirubicin, vincristine and prednisone; CTX, cyclophosphamide; HyperCVAD part A, treatment with high dose cyclophosphamide, doxorubicin, dexamethasone and vincristine; HyperCVAD part B, treatment with high dose cytosine arabinoside, and methotrexate; MINE, mitoxantraone, ifosfamide and etoposide; WHO, World Health Organization.





Zheng G, et al. A retrospective study of autologous SC mobilization by G-CSF in combination with chemotherapy in pts with MM and lymphoma. Oncol Lett. 2020 Jan;19(1):1051-1059.

Poor Mx: risk factors/predictors

Table 2. Risk factors for poor mobilization with CD34$^+$ cell yield <1 × 10^6 cells/kg

Predictive variables	Univariate analysis		Multivariate analysis[a]	
	OR (95% CI)	*p* value	OR (95% CI)	*p* value
Mobilization age, years	1.06 (0.98–1.15)	0.150		
Sex (male)	2.14 (0.65–7.09)	0.214		
ECOG ≥2	0.96 (0.25–3.62)	0.950		
ISS stage				
I	reference			
II	1.49 (0.34–6.50)	0.598		
III	2.76 (0.65–11.68)	0.167		
Comorbidities				
Heart failure	1.53 (0.18–13.18)	0.699		
Chronic pulmonary disease	0.84 (0.10–6.91)	0.872		
Diabetes mellitus	0.64 (0.08–5.16)	0.672		
Hypertension	1.42 (0.45–4.45)	0.549		
Laboratory data before mobilization				
AMC <500/μL	6.43 (1.70–24.31)	0.006	10.75 (1.82–63.57)	0.009
ANC <3,000/μL	3.99 (1.06–15.02)	0.041	3.25 (0.60–17.81)	0.174
>1 line of prior chemotherapy	3.66 (1.12–11.94)	0.031	1.29 (0.25–6.57)	0.760
Platelet <150,000/μL	10.55 (3.16–35.15)	<0.001	12.49 (2.65–58.89)	0.001
Time interval from diagnosis to stem cell harvest ≥180 days	9.69 (2.85–32.91)	<0.001	7.69 (1.61–36.87)	0.011
Laboratory data at MM diagnosis				
Plasma cells of bone marrow ≥60%	0.57 (0.16–1.96)	0.370		
Hemoglobin <100 g/L	1.35 (0.43–4.22)	0.603		
Platelet <150,000/μL	1.01 (0.26–3.86)	0.993		
Serum albumin <35 g/L	1.41 (0.45–4.41)	0.551		
Serum β2-microglobulin ≥466.5 nmol/L	2.38 (0.69–8.29)	0.172		
Corrected serum calcium ≥3 mmol/L	–			
Serum creatinine ≥176.8 μmol/L	1.81 (0.46–7.14)	0.394		
Lactate dehydrogenase ≥250 U/L	0.84 (0.18–4.01)	0.826		
Light chain ratio >100	0.38 (0.08–1.86)	0.232		
First-line therapy	0.66 (0.22–1.98)	0.455		
VTD	0.88 (0.10–7.94)	0.908		
VCD	–			
VAD	reference			
Other	1.62 (0.18–14.40)	0.667		
G-CSF dosage ≥10 μg/kg/day	0.28 (0.06–1.28)	0.101		
Prior radiation	3.12 (0.89–10.92)	0.076	2.97 (0.49–17.83)	0.235

OR, odds ratio; CI, confidence interval; ECOG, Eastern Cooperative Oncology Group performance; ISS, International Staging System; VTD, bortezomib, thalidomide, and dexamethasone; VCD, bortezomib, cyclophosphamide, dexamethasone; VAD, vincristine, doxorubicin, and dexamethasone; G-CSF, granulocyte colony-stimulating factor. [a] All factors with $p < 0.1$ in the univariate analysis were included in the multivariate logistic regression models.

Hsu TL, et al. Risk Factors and Outcomes of SC Mobilization Failure in MM Pts. Transfus Med Hemother. 2022 Sep 5;50(1):39-50.

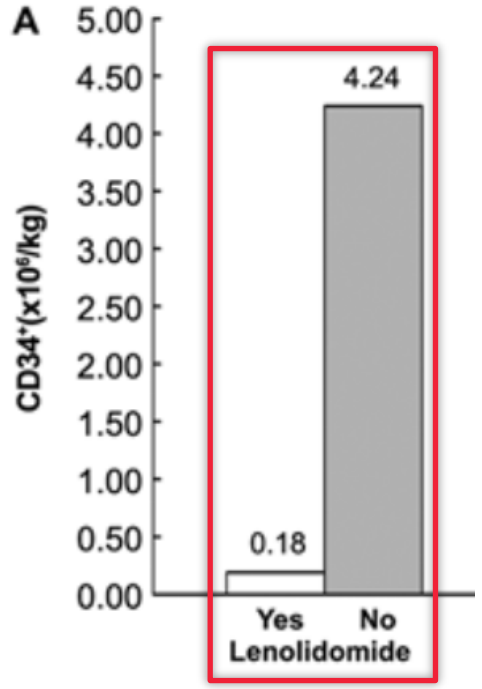
Poor Mx: risk factors/predictors

Lenalidomide

Table I. Baseline characteristics of MM patients and the outcome of PBSCs mobilization.

Patient characteristics	Patients, n (%)	Mobilization, n (%)		P-value
		Success	Failure	
Number	53 (100)	39 (74)	14 (26)	
Age, years[a]	55 (24-64)	55 (24-64)	55.5 (43-64)	0.424
Sex[b]				0.832
Male	29 (55)	21 (54)	8 (57)	
Female	24 (45)	18 (46)	6 (43)	
Status of disease[b]				0.524
PR/VGPR	19 (36)	13 (33)	6 (43)	
CR/nCR	34 (64)	26 (67)	8 (57)	
Number of prior lines[b]				1.000
1	48 (91)	35 (90)	13 (93)	
≥2	5 (9)	4 (10)	1 (7)	
Previous lenalidomide treatment[b]				0.004
Yes	4 (8)	0 (0)	4 (29)	
No	49 (92)	39 (100)	10 (71)	
Previous thalidomide treatment[b]				0.919
Yes	9 (17)	6 (15)	3 (21)	
No	44 (83)	33 (85)	11 (79)	
Previous velcade treatment[b]				0.322
Yes	41 (77)	32 (82)	9 (64)	
No	12 (23)	7 (18)	5 (36)	
Treatment courses[b]				0.075
1-4	22 (42)	19 (49)	3 (21)	
≥5	31 (58)	20 (51)	11 (79)	
Isolation times[b]				0.755
2	42 (79)	30 (77)	12 (86)	
>2	11 (21)	9 (23)	2 (14)	
G-CSF dosage (μg/kg)[a]	5.0 (3.6-7.7)	5.1 (3.6-7.7)	5.0 (4.0-7.5)	0.531
G-CSF duration (d)[a]				0.682
1-5	40 (75)	30 (77)	10 (71)	
>5	13 (25)	9 (23)	4 (29)	
Hematological values				
B-MNC ($x10^9$/l)[a]	2.1 (0.3-8.2)	2.2 (0.4-8.2)	1.8 (0.3-4.3)	0.143
Hb (g/l)[1]	111 (66.3-142)	112.2 (74-142)	103.7 (66.3-122)	0.083
Rct (%)[1]	33 (20.1-42.7)	33.2 (21.8-42.7)	31.4 (20.1-38.2)	0.125
Plt ($x10^9$/l)[1]	90 (26.3-238.5)	90 (26.3-238.5)	89.5 (45-173)	0.896

[a]Mann-Whitney U test; [b]χ^2 test. PR/VGPR, partial response/very good partial response; CR/nCR, complete response/near CR; G-CSF, granulocyte-colony stimulating factor; B-MNC, blood mononuclear cell; Hb, hemoglobin; Rct, reticulocyte; Plt, platelet.



Zheng G, et al. A retrospective study of autologous SC mobilization by G-CSF in combination with chemotherapy in pts with MM and lymphoma. Oncol Lett. 2020 Jan;19(1):1051-1059.

Poor Mx: risk factors/predictors

- Age > 60 y
- Previous radiotherapy
- Prior alkylating agent exposure
- …

Poor Mx: risk factors/predictors

NEW!

Daratumumab

Variable	Group A (Dara)	Group B (No dara)	P-value
Demographics data			
N	47	306	
No. cycles induction therapy (Median, Range)	4 (2-16)	3 (1-23)	
Sex:			
Male	28 (60%)	167 (55%)	0.521
Female	19 (40%)	139 (45%)	
Age (Median, Range)	64.4 (48.9 – 82.9)	65.3 (39.1 – 82.7)	0.7905
Collection data			
Mobilization Regimens:			
G-CSF/plerixafor	27 (57%)	162 (53%)	0.564
CDE	20 (43%)	144 (47%)	
Collection Goal:			
8	26 (55%)	137 (45%)	0.285
10	1 (2%)	3 (1%)	
12	20 (43%)	166 (54%)	
Collection Goal Met:			
Yes	21 (45%)	223 (73%)	<0.001
No	26 (55%)	83 (27%)	
# Collections (Median, Range)	4 (1 -11)	2 (1 -10)	0.0042
Total CD34 dose collected (x10^6/Kg) (Median, Range)	9.3 (3.8 – 21)	11.8 (3.9 - 44.8)	<0.001
CD34 dose per day of collection (x10^6/Kg) (Median, Range)	2.7 (0.5 – 21)	4.9 (0.5 – 44.8)	<0.001
Transplant data			
Cells infused- CD34/Kg (x10^6) (Median, Range)	4.4 (3.09 – 9.14)	5.12 (2.25 – 11.25)	0.00 1
Days to ANC engraftment (Median, Range)	11 (10-12)	11 (9-17)	0.0231
Days to PLT engraftment (Median, Range)	14 (11-22)	13 (10-21)	0.0318
Infection complication:			
Yes	6 (13%)	28 (9%)	0.434
No	41(87%)	278 (91%)	
**Hospital Stay (Days) (Median, Range)	12 (9-17)	12 (6-742)	0.1366

Table 1. Demographics, Collection and Transplantation Data

**one outlier stayed for 742 days

Oza S, et al. Effect of Daratumumab on Stem Cell Mobilization and Engraftment Kinetics Post Autologous SCT in Patients with Newly Diagnosed MM. Blood (2022) 140 (Supplement 1): 10441–10442. ASH 2022

Poor Mx: risk factors/predictors

Daratumumab

Table 1. Collected CD34+ stem cells, plerixafor use and days of stem cell collection.

	Daratumumab-treated, N=92 (%)	Non-daratumumab- treated, N=125 (%)	*P*
Collected CD34+ x10^6 cells/kg			
Mean	5.14	7.22	<0.001
>4x10^6	70 (76)	108 (86)	0.051
failure	5 (5)	1 (0.8)	0.085
Plerixafor use	34 (37)	8 (6)	<0.001
Days of stem cells collection			
Median	2	1	0.018
Mean	1.65	1.42	0.031
>2	14 (15)	9 (7)	0.074

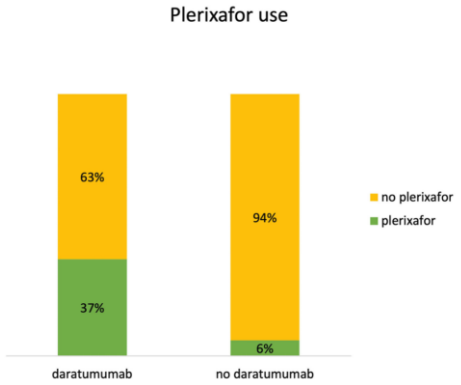


Figure 1. The impact of daratumumab on mean collected stem cells and rescue use of plerixafor.

Lemonakis K, et al. Impact of daratumumab-based induction on stem cell collection parameters in Swedish myeloma patients. Haematologica. 2023 Feb 1;108(2):610-614.

Why should we optimize our protocols?

1. Increased → need to be more **efficient**

2. "Traditional and new" poor mobilization **risk factors/predictors**

3. **Avoid unnecessary apheresis days and remobilizations**

PBSC MOBILIZATION STRATEGIES. CAN WE FURTHER OPTIMIZE OUR PROTOCOLS?

- Introduction - Why should we optimize our protocols?
- Mobilization strategies
- Consensus and protocols
- Take-home messages

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Mobilization strategies

1. Chemotherapy-induced (CT-induced)
2. Steady-state (SS)
3. Plerixafor (PLX)

Mobilization strategies

Planification

- Target SC collection for one autograft
  - ☞ Minimum: 2 x 10^6/kg
  - ☞ Optimal: 4–6 x 10^6/kg (a/w faster neutrophil/plat. recovery, ⇓ hospitalization, blood transfus, and antibiotic Rx)
  - ☞ High (supermobilizers): > 8–10 x 10^6/kg (benefit?)

- Number of autografts
  - ☞ NHL/HL: x 1
  - ☞ MM: x 1-2
  - ☞ Others: x 1-3

	Minimum CD34+/kg	Optimal CD34+/kg
• NHL/HD	2	5
• MM (x 1)	2	5
• MM (x 2)	4	10
• CD34+ selection	6	12

Mohty M, et al. BMT 2014;49:865–72.
Stiff PJ, et al. BBMT 2011;17:1146–53.
Giralt S, et al. BBMT 2014;20:295–308.

Mobilization strategies

Optimal Mx regimen	**CT-ind (+G-CSF)**	**SS (G-CSF)**	**PLX (+G-CSF)**
Higher probability of collecting optimal number of cells	✓		✓
Manageable tolerability		✓	✓
Predictable time to apheresis		✓	✓
Fewer apheresis days	✓		✓
Minimal toxicity and inconvenience for the pt		✓	✓

Hübel K. The EBMT Handbook 2019
Mohty M, et al. BMT 2018;53:246–54.

Mobilization strategies

Plerixafor strategies

- ”Prophylactic”
  - Primary:
    - ☞ 1-2 risk factors: consider
    - ☞ > 2 risk factors: strongly consider
  - Secondary (previous Mx attempt)
    - ☞ Strongly consider
- ”Pre-emptive” (based on pre-apheresis counts)
  - CD34+/mcL in PB pre-apheresis:
    - ☞ < 10: strongly consider
    - ☞ 10–20: consider (gray zone)
- “Rescue”
  - 1^{st} apheresis yield: < 1/3 goal or < 1 x 10^6/kg
    - ☞ Strongly consider

Mobilization strategies

Engraftment in pts mobilized with plerixafor

N= 285	
HU DONOSTIA	76
CH NAVARRA	58
HU M. SERVET	42
HU M. VALDECILLA	35
HU CRUCES	33
CU NAVARRA	18
HC LOZANO BLESA	13
H LOGROÑO	10

Table 1
Baseline demographics and clinical characteristics of patients mobilized with plerixafor.

Characteristic	Total (N = 285)
Median age, years (range)	60 (4–73)
Gender, n (%)	
Female	160 (57)
Male	125 (43)
Weight (Kg), mean (range)	80 (15–134)
Height (cm), mean (range)	166 (106–194)
Diagnosis, n (%)	
Hodgkin lymphoma	29 (10.1)
Non-Hodgkin lymphoma (NHL)	126 (44.21)
Multiple myeloma (MM)	121 (42.4)
Other	9 (3.1)
No. of prior lines of therapy, mean (range)	2 (1–5)
No. of prior lines of therapy, n (%)	
1	113 (39.7)
2	110 (38.6)
3	41 (14.4)
4	18 (6.3)
5	3 (1)
Prior extensive radiotherapy, n (%)	39 (14.7) ND = 19
Previous auto-HCT (≥ 1), n (%)	18 (6.9) ND = 25
No. of previous mobilization attempts, mean (range)	1 (0–4)

HCT, Hematopoietic stem cell transplant; PB, Peripheral blood; ND, Not determined.

Table 2
Use of Plerixafor for Stem Cells mobilization and collection.

	N = 285
Reason for rescue use of Plerixafor, n (%)	
Suboptimal PB $CD34^+$ cell concentration (<10 cells/μl) on day +4	139 (49.3 %)
Low initial apheresis $CD34^+$ cell yield (< 50% target yield*)	93 (32.9 %)
Previous mobilization failure	30 (10.6 %)
Patients predicted to be poor mobilizers based on presence of risk factors	20 (7.9 %)
ND	3 (1.1 %)
Days of PLX administration, mean (range)	1 (1–4)
Up to 1 day, n (%)	176 (62.4 %)
Up to 2 days n (%)	90 (31.9 %)
Up to 3 days, n (%)	10 (3.5 %)
Up to 4 days, n (%)	6 (2.1 %)
Daily PLX dose (μg/kg), mean (range)	0.24 (0.12–0.38)
Pre-apheresis PLX administration (hours), mean (range)	11 (1–18)
Collection counts	
No. of apheresis sessions, mean (range)	2 (1–5)
CD34+ collected ($\times 10^6$ cells/kg), mean (range)	2.95 (0–30.3)
No. of patients with < 2 $\times 10^6$ cells/kg collected after PLX	17

PB, Peripheral blood; ND, Not determined; *Target yield = 2 $\times 10^6$ $CD34^+$ cells/kg.

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Antelo ML, Altuna A, Gimeno JJ, Ferreiro JJ, Amunárriz C, Mateos JJ, Zalba S, Alkorta A, Rifón J, Arroyo JL, Uresandi A, Moreno JA, Nájera MJ, Pinzón S, García A, Vallejo C.
Engraftment after autologous HSCT in patients mobilized with Plerixafor: A retrospective, multicenter study of a large series of Pts. Transfus Apher Sci. 2021 Jun;60(3):103130.

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Mobilization strategies

Engraftment in pts mobilized with plerixafor

	> 500/mcL	> 1000/mcL
ANC	+11 (3-31)	+12 (7-38)

Table 3
Early/short-term hematopoietic outcome after auto-HCT.

	Days to recovery Mean (range)
ANC >0.5 × 10^9/L	+11 (3–31)
ANC >1 × 10^9/L	+12 (7–38)
Platelets >20 × 10^9/L	+13 (5–69)
Platelets >50 × 10^9/L	+19 (9–122)
Platelets >100 × 10^9/L	+27 (10–755)

ANC, absolute neutrophil count. Patients evaluable for graft at day +30: N = 212.

	> 20.000/mcL	> 50.000/mcL	> 100.000/mcL
Plat	+13 (5-59)	+19 (9-122)	+27 (10-755)

Antelo ML, Altuna A, Gimeno JJ, Ferreiro JJ, Amunárriz C, Mateos JJ, Zalba S, Alkorta A, Rifón J, Arroyo JL, Uresandi A, Moreno JA, Nájera MJ, Pinzón S, García A, Vallejo C. Engraftment after autologous HSCT in patients mobilized with Plerixafor: A retrospective, multicenter study of a large series of Pts. Transfus Apher Sci. 2021 Jun;60(3):103130.

Mobilization strategies

Engraftment in pts mobilized with plerixafor

Table 4
Medium-term hematopoietic outcome at 100 days after auto-HCT.

	Cell count Mean (range)
Hemoglobin (g/dL)	12.3 (7.9–16.5)
ANC (x10^9/L)	2.3 (0.1–13)
Platelets (x10^9/L)	137 (7–340)

ANC, absolute neutrophil count. Patients evaluable for graft at day +100: N = 191.

Cumulative incidence	Day +30	Day +100
ANC > 500/mcL	99.5%	98.4%
Plat > 20,000/mcL	92.0%	97.4%

- ✓ Large multicentric series
- ✓ PLX: PBSC collection to levels suitable for auto-HCT in the large majority of poor mobilizers
- ✓ PLX: optimal short- and medium-term engraftment in the majority of cases (quality of graft)
- ✓ PLX: major advance in SC-Mx and auto-HCT procedures

Antelo ML, Altuna A, Gimeno JJ, Ferreiro JJ, Amunárriz C, Mateos JJ, Zalba S, Alkorta A, Rifón J, Arroyo JL, Uresandi A, Moreno JA, Nájera MJ, Pinzón S, García A, Vallejo C. Engraftment after autologous HSCT in patients mobilized with Plerixafor: A retrospective, multicenter study of a large series of Pts. Transfus Apher Sci. 2021 Jun;60(3):103130.

PBSC MOBILIZATION STRATEGIES. CAN WE FURTHER OPTIMIZE OUR PROTOCOLS?

- Introduction - Why should we optimize our protocols?
- Mobilization strategies
- Consensus and protocols
- Take-home messages

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Consensus and protocols

UK consensus

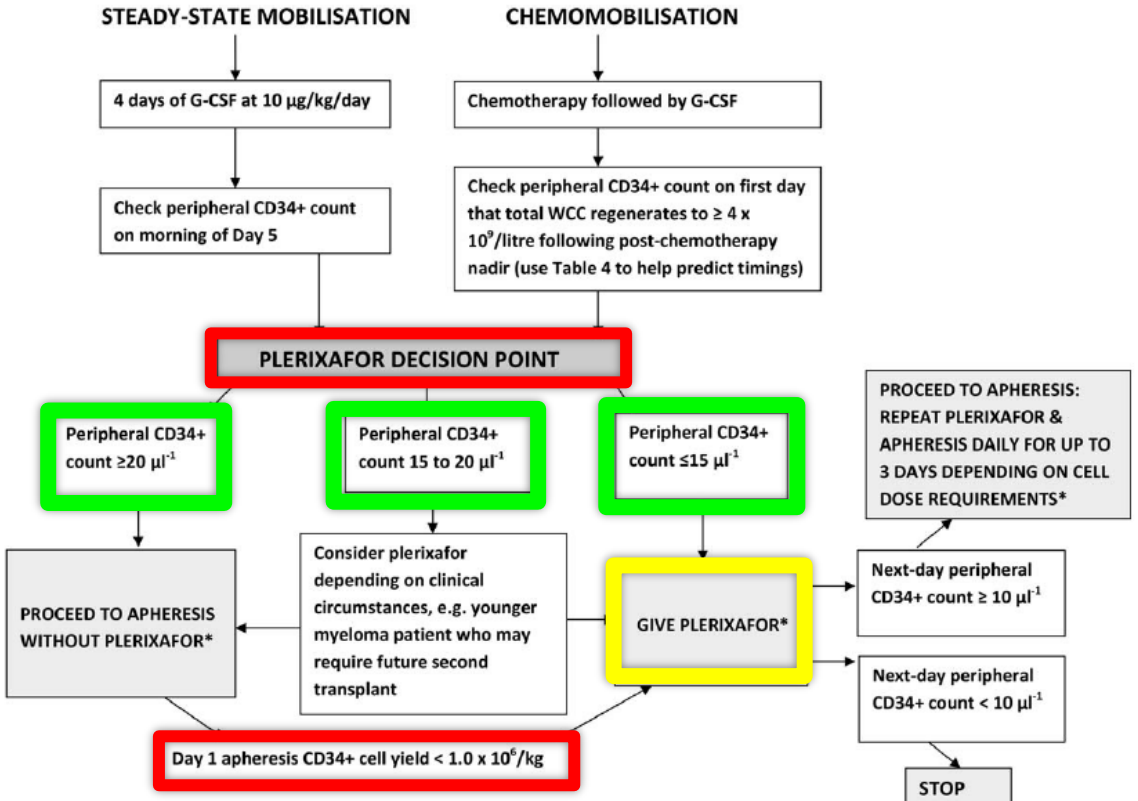


FIGURE 1 Recommended algorithm for pre-emptive plerixafor use.


UK consensus statement on the use of plerixafor to facilitate autologous Peripheral Blood Stem Cell collection to support high-dose chemoradiotherapy for patients with malignancy

Douglas KW, et al. UK consensus statement on the use of plerixafor to facilitate autologous PBSC collection to support high-dose chemoradiotherapy for pts with malignancy. J Clin Apher. 2018 Feb;33(1):46-59.

Consensus and protocols

Spanish consensus

❑ CD34 + dose per transplant (yield)

✓ Minimum to proceed: ≥2 × 10^6 CD34 + cells /kg

✓ Higher yields of 4–5 × 10^6 CD34 + cells /kg: a/w faster ANC and platelets recovery, reduced hospitalization, blood transfusions, and antibiotic therapy

❑ G-CSF (filgrastim or filgrastim biosimilars)

✓ Dose: 10 µg/kg/day (x 4-6 days)

✓ Leukapheresis:

- 5^{th} day (after 4 stimulation's days)
- Maximum leukapheresis days: 3

❑ Definitions base on CD34/mcL (PB)

- <5: Non mobilizers
- 5–10: Very poor mobilizers
- 10–20: Poor mobilizers

Bueno JL, Alegre A, López O, Querol S, Arroyo JL, Goterris R, Sureda A, García J, Amunarriz C, Albo C, Fernández F, Medina L, Antelo ML, Blanquer M, Vallejo C, Canales M, Vidales I, Duarte R. Agreements and uncertainties in autologous HSC mobilization and collection. A Spanish consensus document. BMT 2020 Apr;55(4):811-7

Consensus and protocols

Spanish consensus

❑ Plerixafor use

✓ PLX + G-CSF (+/- CT): increases CD34+ yield and is effective in poor mobilizers

✓ PLX is well tolerated

✓ PLX dose: 240 µg/kg sc 6–11 h before initiating PBSC collection

✓ PLX should be used rationally under hematologists expert prescription.

✓ PLX use:

- a) Identification of poor mobilizers
- b) CD34+/µl in PB at day + 4: <10 (clear) // 10-20 (grey zone)
- c) In proven mobilization failure episode (mobilization failure)

✓ Effectiveness in a) is superior to c). So, algorithms and predictors to early define poor mobilizers are needed

Bueno JL, Alegre A, López O, Querol S, Arroyo JL, Goterris R, Sureda A, García J, Amunarriz C, Albo C, Fernández F, Medina L, Antelo ML, Blanquer M, Vallejo C, Canales M, Vidales I, Duarte R. Agreements and uncertainties in autologous HSC mobilization and collection. A Spanish consensus document. BMT 2020 Apr;55(4):811-7

Consensus and protocols

Red Cross Medical Center, Tokyo, Japan

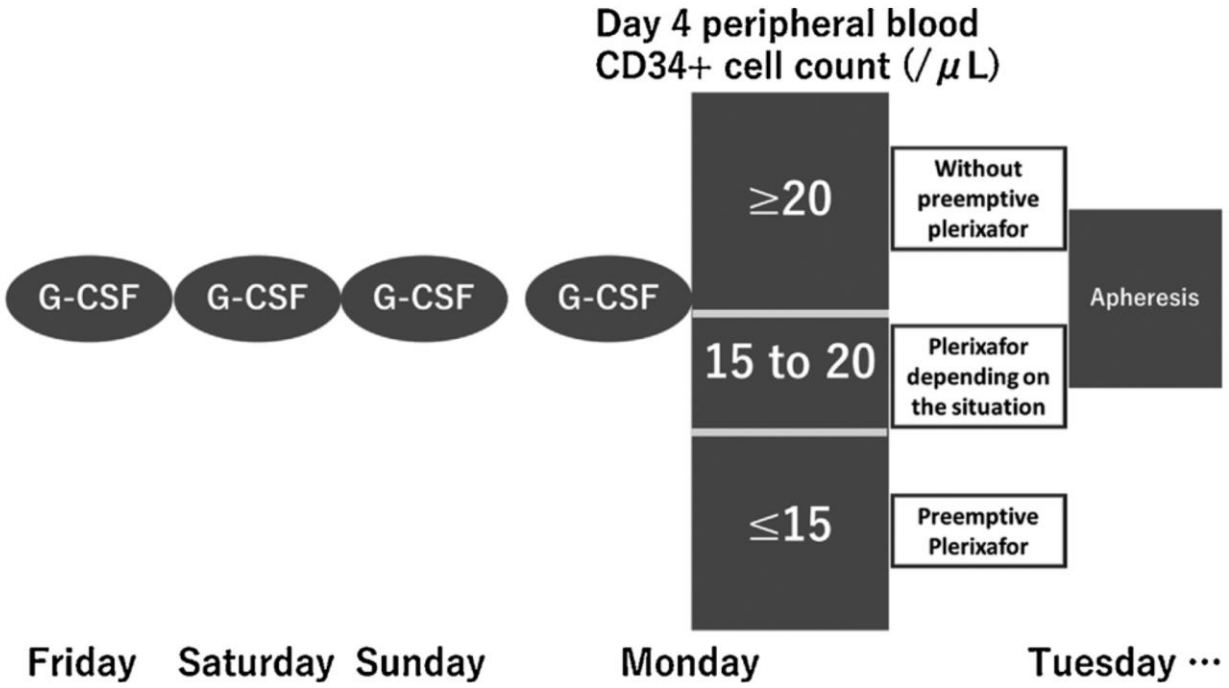


Fig. 2. Protocol of the first mobilization with granulocyte-colony stimulating factor and preemptive plerixafor. G-CSF, granulocyte-colony stimulating factor.

Miyazaki K, Suzuki K. Poor mobilizer and its countermeasures. Transfus Apher Sci. 2018 Oct;57(5):623-627

Consensus and protocols

North Caroline U. H.

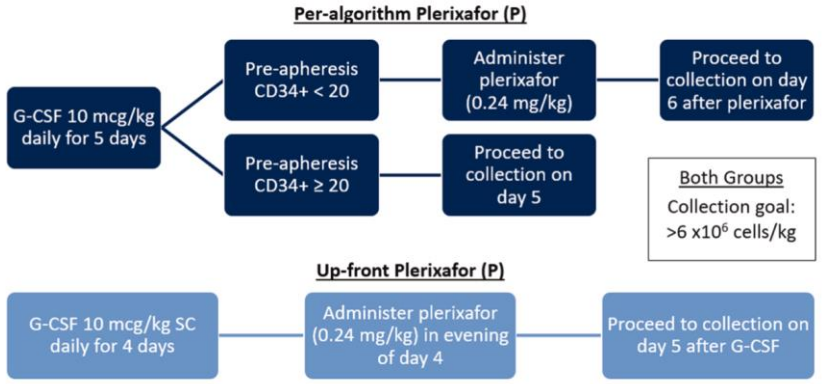


Fig. 1. Mobilization Algorithm.
G-CSF: granulocyte colony stimulating factor

Table 1
Baseline characteristics.

Characteristic	Per-algorithm P (n = 55)	Up-front P (n = 74)
Age (years)*	59 (30–75)	63 (39–76)
Sex, n (%)		
Male	29 (53 %)	39 (53 %)
Female	26 (47 %)	35 (47 %)
Race, n (%)		
Caucasian	34 (62 %)	47 (64 %)
African American	21 (38 %)	26 (35 %)
Pacific Islander	0 (0 %)	1 (1 %)
Indication for Transplant, n (%)		
Multiple Myeloma	53 (96 %)	69 (93 %)
Amyloid	2 (4 %)	5 (7 %)
Prior Lines of Therapy, n (%)		
< 3	53 (96 %)	70 (95 %)
≥ 3	2 (4 %)	4 (5 %)
Prior Cycles of IMiD, n (%)		
< 6	36 (65 %)	50 (68 %)
≥ 6	19 (35 %)	24 (32 %)
Days Since Last Chemotherapy, n (%)		
< 30	14 (25 %)	12 (16 %)
≥ 30	41 (75 %)	62 (84 %)
Conditioning Regimen, n (%)		
Melphalan 200 mg/m²	46 (84 %)	54 (73 %)
Melphalan 140 mg/m²	9 (16 %)	20 (27 %)
Plerixafor Administered		
Yes	29 (53 %)	74 (100 %)
No	26 (47 %)	0 (0 %)

* Data expressed as median (range).

- Single center
- Retrospective analysis
- Adults with MM or amyloidosis
- Apheresis of HSC
- Two groups
  - ✓ 3/1/17-3/1/18: “per algorithm” PLX (n=55)
  - ✓ 3/1/18-3/1/19: “up-front” PLX (n=74)

Chen KY, et al. Plerixafor strategies for autologous HCT mobilization: A comparison of efficacy and cost. Transfus Apher Sci. 2022 Apr;61(2):103303.

Consensus and protocols

North Caroline U. H.

	Per protocol PLX	Up front PLX	p
• Apheresis days (median)	1.5	1.0	< 0.001
• CD34+ (median) (x 10^6/kg)	6.6	8.5	< 0.001

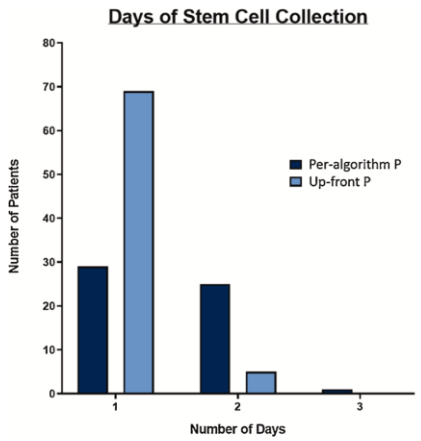
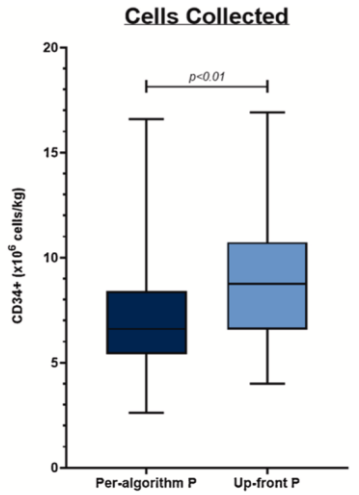


Fig. 3. Apheresis Days.
P: plerixafor

Up- front PLX:
- ✓ ⇧ drug cost
- ✓ ⇩ apheresis costs
- ✓ Net savings of $121 per patient

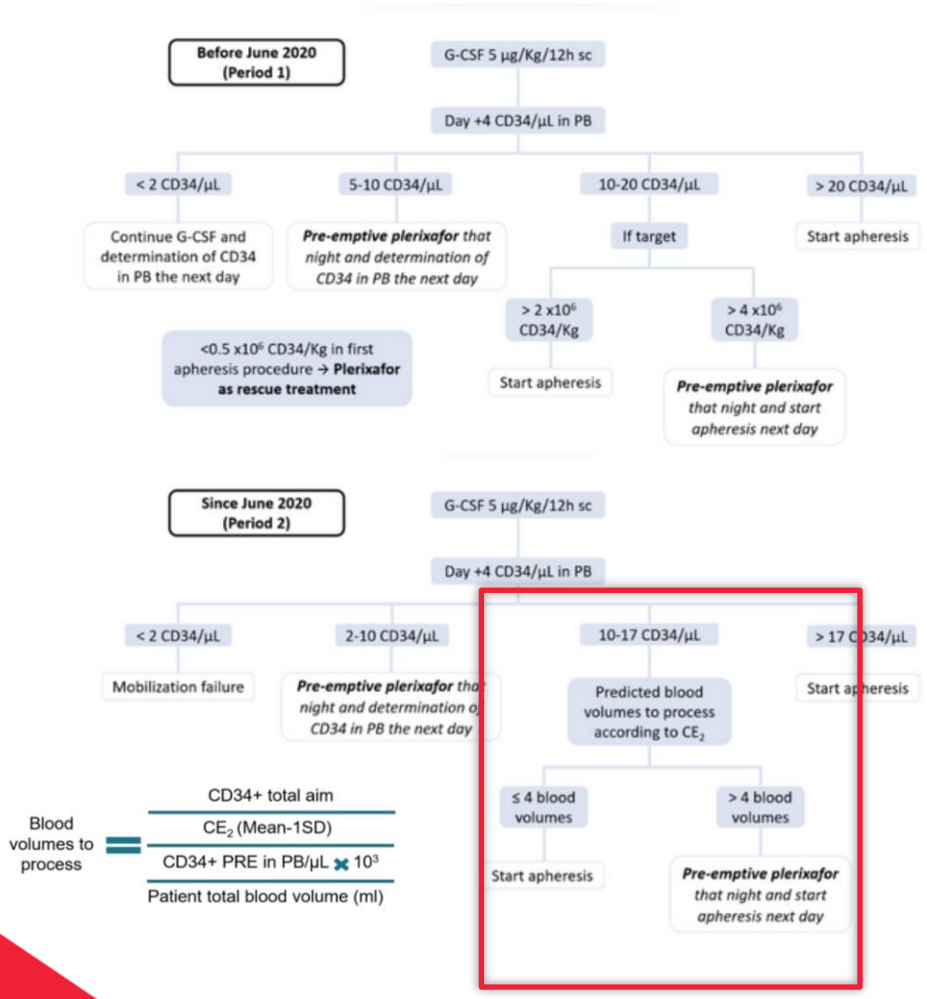


Chen KY, et al. Plerixafor strategies for autologous HCT mobilization: A comparison of efficacy and cost. Transfus Apher Sci. 2022 Apr;61(2):103303.

Consensus and protocols

EBMT

Ramón y Cajal U. H.



	Period 1	Period 2	*p*
Apherised patients	75	150	
Patients who required >1 procedure (%)	30 (40%)	30 (20%)	*0.002*
Patiets who received plerixafor	<24 (32%)	57 (38%)	*0.377*
Apheresis procedures required			*0.010*
1 (%)	10 (42%)	41 (72%)	
2	12	14	
3	2	0	
Doses of plerixafor			*0.166*
1	15 patients	45 patients	
2 (%)	9 patients (37%)	12 patients (21%)	
Total	33 doses	69 doses	
Age, median (Q1-Q3)	60 (42-65)	61 (55-66)	*0.153*
Diagnosis			*0.416*
HL (%)	3 (13%)	3 (5%)	
NHL (%)	7 (29%)	19 (33%)	
MM (%)	11 (46%)	29 (51%)	
Other PCD (%)	2 (8%)	6 (11%)	
Others (%)	1 (4%)	0	

- ✓ G-CSF +/– PLX: CD34 goal in 97.8% pts
- ✓ Period 2:
  - ⇩ apheresis procedures/pt
  - Not ⇧ in PLX use

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Palomo P, et al. Rational use of plerixafor using a combined algorithm of CD34 count in P and predicted blood volumes to process according to collection efficiency coefficient. OS11-02. EBMT 2023

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Take-home messages

- Pre-decide the collection goal for each patient
- Try to avoid mobilization failures
- Avoid CT is not necessary for treatment disease
- Consider patient medical history
- Pre-collection CD34+ goal are crucial (center-specific)
- Optimize our protocols

Simpósio Satélite

NUEVOS ENFOQUES EN MOVILIZACIÓN DE
PROGENITORES HEMATOPOYÉTICOS Y TRATAMIENTO DE PTTA

PBSC MOBILIZATION STRATEGIES.
CAN WE FURTHER OPTIMIZE OUR PROTOCOLS?

THANK YOU

Carlos Vallejo

Hospital Clínico Universitario de Santiago

33 CONGRESO SOCIEDAD ESPAÑOLA DE TRANSFUSIÓN SANGUÍNEA Y TERAPIA CELULAR

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