HAPLOIDENTICAL VS MATCHED DONOR AND ALLOGENEIC VS AUTOLOGOUS STEM CELL TRANSPLANTATION IN HEMATOLOGIC MALIGNANCIES: A SYNTHESIS OF SYSTEMATIC REVIEWS

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INTRODUCTION

Stem cell transplantation remains a cornerstone in treating hematologic malignancies. This synthesis compares efficacy and safety profiles of haploidentical hematopoietic stem cell transplantation with posttransplant cyclophosphamide (HAPLO-PTCy) vs matched donors, and of allogeneic stem cell transplantation (allo-SCT) vs autologous stem cell transplantation (auto-SCT), in specific lymphoma and other hematologic malignancy subtypes.

AIM

To synthesize contemporary systematic reviews and meta-analyses (2019–2021) comparing:

- HAPLO-PTCy vs matched related/unrelated donor transplantation
- Allogeneic vs autologous SCT in relapsed/refractory hematologic malignancies

METHOD

Systematic reviews and meta-analyses published between 2019 and 2021 were included. Extracted data comprised study size, patient population, primary outcomes (overall survival [OS], progression-free survival [PFS], graft-vs-host disease [GVHD], relapse, non-relapse/treatment-related mortality [NRM/TRM]), and pooled effect estimates with 95% confidence intervals (CIs).

CONCLUSIONS

HAPLO-PTCy offers survival similar to matched donors, with comparable relapse rates except for higher relapse than MUD, supporting its use when matched donors are unavailable. In relapsed/refractory PTCL, allo-SCT and auto-SCT yield comparable overall and progression-free survival; allo-SCT lowers relapse through a graft-versus-lymphoma effect but carries substantially higher treatment-related mortality (3-year TRM 32% vs 7%). These findings do not support a broad survival advantage for allo-SCT in PTCL and underscore the importance of individualized donor selection and risk stratification based on relapse risk and transplant fitness.

RESULTS

- Gagelmann et al (2019) — 30 studies, N=22,974; HAPLO-PTCy vs MRD/MUD/MMUD. OS was similar across comparators (HAPLO vs MRD OR 1.17 [1.05–1.30]; vs MUD 1.06 [0.96–1.18]; vs MMUD 0.79 [0.65–0.97]).
- Relapse was comparable except higher vs MUD (OR 1.20 [1.04–1.40]). Grade II–IV acute GVHD differed by comparator — increased vs MRD (OR 1.32 [1.07–1.62]), reduced vs MUD (0.76 [0.62–0.93]) and MMUD (0.51 [0.32–0.81]), no overall difference (0.95 [0.80–1.13]).
- Severe grade III–IV acute GVHD was more consistently reduced (overall OR 0.72 [0.60–0.88]).
- Du et al. (2021) — 30 studies, N=1,765 (880 allo, 885 auto) in R/R PTCL. OS and PFS were similar between modalities (5-year OS 54% [47–62] allo vs 53% [44–64] auto; 5-year PFS 48% [40–56] vs 40% [24–58]). 3-year TRM was substantially higher with allo-SCT (32% [27–37]) vs auto-SCT (7% [2–23]).
- Kunacheewa et al (2020) — 14 AML/MDS studies. OS was comparable between haplo-HSCT and matched donors (vs MRD OR 0.85 [0.70–1.04]; vs MUD 1.12 [0.89–1.41]). Acute GVHD was higher vs MSD; chronic GVHD lower vs MUD.
- Collectively, HAPLO-PTCy yields survival comparable to MRD/MUD, comparable relapse (higher only vs MUD), increased grade II–IV acute GVHD only vs MRD, and more consistently reduced severe grade III–IV acute GVHD.
- In R/R PTCL, allo- and auto-SCT achieve similar OS/PFS, with allo-SCT trading lower relapse for substantially higher treatment-related mortality.

META-ANALYSIS · LYMPHOMA

Table 1. HAPLO-PTCy vs Matched Donors in Lymphoma

Gagelmann et al., Cancer, 2019

30 studies **N = 22,974** patients Odds ratios (OR) · **OR < 1** favors HAPLO for adverse outcomes

OUTCOME	COMPARISON	OR (95% CI)	INTERPRETATION
OVERALL SURVIVAL			
Overall survival	HAPLO vs MRD	1.17 (1.05-1.30)	Comparable
Overall survival	HAPLO vs MUD	1.06 (0.96-1.18)	Comparable
Overall survival	HAPLO vs MMUD	0.79 (0.65-0.97)	Favors HAPLO
ACUTE GVHD, GRADE II-IV			
Acute GVHD II-IV	HAPLO vs MRD	1.32 (1.07-1.62)	Higher with HAPLO
Acute GVHD II-IV	HAPLO vs MUD	0.76 (0.62-0.93)	Favors HAPLO
Acute GVHD II-IV	HAPLO vs MMUD	0.51 (0.32-0.81)	Favors HAPLO
ACUTE GVHD, GRADE III-IV			
Acute GVHD III-IV	HAPLO vs MRD	0.89 (—)	Comparable
Acute GVHD III-IV	HAPLO vs MUD	0.63 (—)	Favors HAPLO
Acute GVHD III-IV	HAPLO vs MMUD	0.38 (—)	Favors HAPLO
RELAPSE			
Relapse	HAPLO vs MRD	1.01 (0.86-1.17)	Comparable
Relapse	HAPLO vs MUD	1.20 (1.04-1.40)	Higher with HAPLO
Relapse	HAPLO vs MMUD	1.06 (0.77-1.47)	Comparable

META-ANALYSIS · AML/MDS

Table 3. Haploidentical vs Matched Donor HSCT in AML/MDS

Kunacheewa et al., 2020

14 studies Odds ratios (OR)

OUTCOME	COMPARISON	OR (95% CI)	INTERPRETATION
Overall survival	Haplo-HSCT vs MRD	0.85 (0.70-1.04)	Comparable
Overall survival	Haplo-HSCT vs MUD	1.12 (0.89-1.41)	Comparable
Acute GVHD	Haplo-HSCT vs MSD	–	Higher with Haplo-HSCT
Chronic GVHD	Haplo-HSCT vs MUD	–	Lower with Haplo-HSCT

Source: Kunacheewa et al., 2020.

META-ANALYSIS · PTCL

Table 2. Allogeneic vs Autologous SCT in Relapsed/Refractory PTCL

Du et al., JAMA Network Open, 2021

14 studies **N = 2,448** patients Pooled proportions with 95% CI

OUTCOME	ALLOGENEIC SCT	AUTOLOGOUS SCT
3-year OS	50% (41-60)	55% (48-64)
5-year OS	54% (47-62)	53% (44-64)
3-year PFS	42% (35-51)	41% (33-51)
5-year PFS	48% (40-56)	40% (24-58)
3-year TRM	32% (27-37)	7% (2-23)

PFS pools EFS/DFS; TRM pools TRM/NRM. No pooled relapse estimate was reported by the source. **Source:** Du et al., *JAMA Network Open*, 2021.

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REFERENCES

1. Gagelmann N, et al. Haploidentical stem cell transplantation with posttransplant cyclophosphamide vs matched donor transplantation: a meta-analysis. 2019.

2. Du J, et al. Allogeneic vs autologous stem cell transplantation in relapsed/refractory peripheral T-cell lymphoma: a systematic review and meta-analysis. 2021.

3. Kunacheewa C, et al. Haploidentical vs matched donor hematopoietic stem cell transplantation in AML/MDS: a meta-analysis. 2020.