Not for publication or presentation

A G E N D A
CIBMTR WORKING COMMITTEE FOR IMMUNOBIOLOGY WORKING COMMITTEE
Salt Lake City, UT
Saturday, February 7, 2026, 1:00 – 3:00 PM (MT)

Co-Chair:	**Brian Betts, MD; Roswell Park Cancer Institute, Minneapolis, MN; Telephone: 716-845-1300; Email: brian.betts@roswellpark.org**
Co-Chair:	**Cara Benjamin, PhD; University of Miami Miller School of Medicine, Miami, FL; Telephone: 305-243-5534; E-mail: c.benjamin3@miami.edu**
Co-Chair:	**Esteban Arrieta-Bolaños, MQC PhD; Universitatsklinikum Essen KMT, Essen Germany; E-mail: Esteban.arrieta-bolanos@uk-essen.de**
Scientific Director:	**Rohtesh Mehta, MD MPH MS; M.D. Anderson Cancer Center, Houston, TX; Telephone: 713-563-8166; E-mail: rmehta1@mdanderson.org**
Scientific Director:	**Yung-Tsi Bolon, PhD; CIBMTR® (Center for International Blood and Marrow Transplant Research), Minneapolis, MN; Telephone: 763-406-5742; E-mail: ybolon@nmdp.org**
Statistical Director:	**Tao Wang, PhD; CIBMTR® (Center for International Blood and Marrow Transplant Research), Milwaukee, WI; Telephone: 414-955-4339; E-mail: taowang@mcw.edu**
Statistician:	**Sarita Layton, MPH; CIBMTR® (Center for International Blood and Marrow Transplant Research), Minneapolis, MN; Telephone: 763-406-8154; E-mail: slayton@nmdp.org**
Page Scholar:	**Taymour Hammoudi, MD PhD BS; Children's Hospital Colorado, Aurora, CO; Telephone: 720-777-8563; E-mail: Taymour.hammoudi@cuanschutz.edu**

Agenda Summary

Opening remarks and introduction - presented by Yung-Tsi Bolon

Presentation of new proposals

a. PROP 2509-45 Impact of Novel HLA Evolutionary Divergence Score on Clinical Outcomes of AML Recipients after Haploidentical Stem Cell Transplantation – presented by Dr. Katikaneni

Presentation of updates for completed/ongoing studies

a. IB22-02 Effect of SIRPα mismatch on the outcome of allogeneic hematopoietic stem cell transplantation from an HLA matched related donor – presented by Dr. Srour
b. IB23-03 Impact of adherence to cord blood guidelines – presented by Dr. Metheny via Zoom

Concluding remarks – presented by Rohtesh Mehta

Detailed Agenda

1. **Opening remarks and introduction - Yung-Tsi Bolon**
2. **Working committee overview – Rohtesh Mehta**
3. **CIBMTR Biorepository, PRO data - Cara Benjamin**
4. **CIBMTR public datasets – Brian Betts**
5. **CIBMTR Page Scholar program overview – Taymour Hammoudi**

6. **Future/proposed studies - Rohtesh Mehta**
    a. **PROP 2509-45** Impact of Novel HLA Evolutionary Divergence Score on Clinical Outcomes of AML Recipients after Haploidentical Stem Cell Transplantation (P Katikaneni/ K Quann) (**Attachment 4**)

    Proposed studies; not accepted for consideration at this time

    k. **PROP 2503-02** Comparing incidence and severity of GVHD in B-cell ALL patients undergoing allo-HSCT with and without prior CAR-T therapy (R Chavan). ***Dropped due to overlap with current study/publication.***
    l. **PROP 2509-71** Comparison of HLA 7/8, without non-HLA risk factors, with HLA 8/8, with non-HLA risk factors, in patients with hematologic malignancies undergoing unrelated donor hematopoietic cell transplantation with PTCy-based prophylaxis (L Arcuri/ N Hamerschlak). ***Dropped due to overlap with current study/publication.***
    m. **PROP 2509-83** Does HLA-DPB1 Permissive Mismatch Reduce Relapse after 8/8 Unrelated Donor Transplant with PTCy for Myeloid Malignancies? (P Smallbone/ B Oran). ***Dropped due to overlap with current study/publication.***
    n. **PROP 2509-84** Impact of Duffy-null Associated Neutrophil Count on Unrelated Donor Transplant Outcomes (A Klein). ***Proposal dropped due to need for supplementary data.***
    o. **PROP 2509-89** Outcomes and prognostic factors of second allogeneic hematopoietic cell transplantation across all donor types in the era of PTCy-based GVHD prophylaxis. (Y Aljawai). ***Dropped due to overlap with current study/publication.***
    p. **PROP 2509-101** PBSC versus BM Grafts in AlloHSCT for Hematological Malignancies with PTCY-based GVHD Prophylaxis: A Comparative Analysis (A Mina). ***Dropped due to overlap with current study/publication.***
    q. **PROP 2509-123** Novel KIR2DS4:HLA-B*35 interaction predicts pediatric patient survival post haploidentical HCT (P Chockley/ M de Lima). ***Proposal dropped due to need for supplementary data.***
    r. **PROP 2509-126** Comparative Outcomes of Highly Human Leukocyte Antigen (HLA)-Mismatched Unrelated Donors Versus Matched and Single Locus Mismatched Unrelated Donors in Hematopoietic Cell Transplantation with Post-Transplant Cyclophosphamide (PTCY) (M Ellithi/ B Shaffer). ***Dropped due to small sample size.***
    s. **PROP 2509-152** Impact of graft composition on the outcomes of mismatched unrelated donor PBSCT with PTCy (B Dholaria/ O Oluwole). ***Dropped due to overlap with current study/publication.***
    t. **PROP 2509-175** Impact of Donor-Specific Antibodies (DSA) to DPB1 and DRB3/4/5 on Outcomes of 9/10 and 10/10 Matched Unrelated Donor Allogeneic Hematopoietic Cell Transplantation (Y Alnimer/ F Yalniz). ***Dropped due to small sample size.***
    u. PROP 2509-218 Validation of the Haplo Donor Selector Tool in MMUD transplant with PTCy (P Grover/ M Juckett). ***Dropped due to overlap with current study/publication.***

7. Presentations, Publications or Submitted papers – Esteban Arrieta-Bolaños

a. **IB10-01r** Rafati M, Wang Y, Koppayi AL, Savage SA, Godley LA, Williams KM, Porter C, Jones K, Hicks B, Spellman SR, He M, Atshan R, Iwuagwu C, Bolon YT, Arrieta-Bolaños E, Saultz JN, Benjamin CL, Lee SJ, Saber W, Gadalla SM. Germline pathogenic variants in MUTYH are associated with inferior survival after hematopoietic cell transplantation in patients with hematologic malignancies or disorders. **American Journal of Hematology. doi:10.1002/ajh.70093. Epub 2025 Oct 3.**

b. **IB22-01** McCurdy SR, Solomon SR, Shaffer BC, He M, Bolon YT, Blouin AG, Keyzner A, Socola FA, Ibrahim U, Zou J, Safah H, Saba N, Gadalla S, Perales MA, Paczesny S, Marsh SGE, Petersdorf EW, Wang T, Lee SJ, Fuchs EJ. Post-Transplant Cyclophosphamide improves survival in HLA-DPB1 mismatched unrelated donor allogeneic transplantation. **Transplantation and Cellular Therapy. S2666-6367(25):01480-0. doi:10.1016/j.jtct.2025.09.048. Epub 2025 Oct 1.**

c. **IB23-02** Mehta RS, Schmidt G, Williams K, Patel SA, Schetelig J, Savani B, Askar M, Petersdorf E, Ringden O, Kanakry CG, Kanakry JA, Stefanski H, Arrieta-Bolaños E, Betts B, Benjamin C, Gadalla S, Wang T, Saultz J, Spellman S, Jurdi NE, Bolon YT, Lee SJ. Choosing between HLA-mismatched unrelated and haploidentical donors: Donor age considerations. **Transplantation and Cellular Therapy. doi:10.1016/j.jtct.2025.05.019. Epub 2025 May 24. PMC12403200.**

d. **IB22-03** Nath K, Zhang MJ, Bye M, Abid MB, Benjamin C, Betts BC, Bhatt NS, Arrieta-Bolaños E, Bolon YT, Gadalla SM, Grunwald MR, Krem MM, Lee SJ, Marsh SGE, Martino R, Mehta PA, Milano F, Prestidge T, Saultz JN, Shaw BE, Spellman SR, Choe HK, Shaffer BC. Transplant outcomes Using Older Matched Sibling Donors Compared to Young Alternative Donors: A CIBMTR Analysis. **Blood Advances. 2025 Jul 22; 9(14):3469-3478. doi:10.1182/bloodadvances.2024014858. Epub 2025 Mar 6. PMC12274812.**

e. **IB06-05i** Petersdorf EW, McKallor C, Malkki M, Hsu K, He M, Spellman SR, Gooley T, Stevenson P. The association of HLA-E ligand and NKG2 receptor variation with relapse and mortality after haploidentical related donor transplantation. **Transplantation and Cellular Therapy. 2025 Mar 1; 31(3):137-156. doi:10.1016/j.jtct.2025.01.004. Epub 2025 Jan 9. PMC11875940.**

f. **IB21-01** Saultz JN, Bolon YT, Wang T, Spellman S, Lee S, He M, Camacho-Bydume C, Krishna C, Chowell D, Shaffer BC, Hsu KC, Paczesny S, Gadalla SM, Marsh SGE, Betts BC, Arrieta-Bolaños E. Higher HLA-DRB1 Evolutionary Divergence (HED) Is Associated With Reduced Relapse and Improved Survival After Matched Unrelated Hematopoietic Cell Transplantation. **Transplantation and Cellular Therapy. 13:S2666-6367(25)02611-9. doi: 10.1016/j.jtct.2025.12.949. Epub ahead of print. PMID: 41397550.**

g. **IB23-02 Choosing** between HLA-Mismatched Unrelated and Haploidentical Donors: Donor Age Considerations (R Mehta) ***Poster Presentation, Tandem Meetings 2025.***

h. **IB23-01** Immunopeptidome Divergence between Mismatched HLA Haplotypes and Survival after Haploidentical HCT: A Retrospective Study from the CIBMTR (P Crivello/ K Fleischhauer). ***Oral Presentation, EBMT 2025; Oral Presentation, EFI 2025.***

i. **IB23-03** Adherence to CB guidelines improves transplant outcomes in adults with hematological malignancies (L Metheny). ***Poster Presentation, EBMT 2025; Poster Presentation, ASH 2025.***

j. **IB15-04** Association between pre-transplant biological aging markers and clinical outcomes in allogeneic hematopoietic cell transplant recipients (K Rentscher). ***Poster Presentation, ASCO 2025.***

8. Studies in progress (Attachment 3) – Esteban Arrieta-Bolaños

a. **IB23-01** Immunopeptidome divergence between mismatched HLA and outcome of haploidentical HCT (P Crivello). **Manuscript Preparation.**

b. **IB24-01** 6-locus HLA immunopeptidome divergence and outcome of mismatched unrelated HCT (E Arrieta-Bolaños/ K Fleischhauer). **Datafile Preparation.**
c. **IB24-02** Effect of donor KIR and donor KIR ligand on CD8+ T cell-mediated alloreactivity in unrelated HCT for AML, ALL and MDS (B Asquith). **Protocol Development.**
d. **IB18-07** Donor and recipient genomic associations with acute GVHD (V Afshar-Khargan). **Analysis.**
e. **IB22-02** Effect of SIRPα mismatch on the outcome of allogeneic hematopoietic stem cell transplantation from an HLA matched related donor (J Zou/ S Srour). **Manuscript Preparation – Dr. Srour will present the updates of the study**
f. **IB23-03** Impact of adherence to cord blood guidelines. (L Metheny/ F Milano). **Manuscript Preparation. – Dr Metheny will present the updates of the study**
g. **IB25-01** Haploidentical donor selection for patients with Aplastic Anemia: HLA and non-HLA factors (R Mehta/ A Ruggeri). **Protocol Pending.**

9. Closing remarks - Rohtesh Mehta

MINUTES
CIBMTR WORKING COMMITTEE FOR IMMUNOBIOLOGY WORKING COMMITTEE
Honolulu, HI
Saturday, February 15, 2025, 1:00 – 3:00 PM HST

Co-Chair:	**Brian Betts, MD; Roswell Park Cancer Institute, Minneapolis, MN; Telephone: 716-845-1300; Email: brian.betts@roswellpark.org**
Co-Chair:	**Cara Benjamin, PhD; University of Miami Miller School of Medicine, Miami, FL; Telephone: 305-243-5534; E-mail: c.benjamin3@miami.edu**
Co-Chair:	**Esteban Arrieta-Bolaños, MQC, PhD; University Hospital Essen, Germany; E-mail: Esteban.arrieta-bolanos@uk-essen.de**
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Scientific Director:	**Yung-Tsi Bolon, PhD; CIBMTR® (Center for International Blood and Marrow Transplant Research), Minneapolis, MN; Telephone: 763-406-5742; E-mail: ybolon@nmdp.org**
Statistical Director:	**Tao Wang, PhD; CIBMTR® (Center for International Blood and Marrow Transplant Research), Milwaukee, WI; Telephone: 414-955-4339; E-mail: taowang@mcw.edu**
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Agenda Summary

- **Introduction and overview of progress** 1:00pm
- **Presentation of updates for completed/ongoing study** 1:15– 1:30pm
  - IB23-03: Impact of adherence to cord blood guidelines.
- **Presentation of new proposals** 1:30 – 2:55pm
  - PROP 2401-02 Autoimmune HLA alleles predict superior outcomes in patients receiving allogeneic hematopoietic stem cell transplantation
  - PROP 2407-02 The impact of HNA alloimmunization on engraftment failure in unrelated hematopoietic stem cell transplantation
  - PROP 2410-76 Haploidentical donor selection for patients with Aplastic Anemia: HLA and non-HLA factors
  - PROP 2410-77 The role of HLA class II mismatched HCT in patients with high-risk acute leukemia
  - PROP 2410-82 + PROP 2410-153 The Role of inhibitory KIR Scoring and NK Cell Alloreactivity in MUD and Haplo-HSCT with Post-Transplant Cyclophosphamide
- **Concluding remarks** 2:55pm

Detailed Agenda

- **Introduction** **Brian Betts** 1:00pm
    a. Minutes and Overview Plan of Immunobiology Working Committee from Tandem 2024 **(Attachment 1)**

- **Research sample repository update with data accrual tables (Attachment 2)**

- **Presentations, Publications or Submitted papers** 1:05pm
    a. **IB16-02** Novel scoring system for ranking hematopoietic stem cell transplantation. Baxter-Lowe LA, Wang T, Kuxhausen M, Spellman SR, Maiers M, Lee SJ, Saultz J, Arrieta-Bolaños E, Gadalla SG, Bolon Y, Betts BC. **Clinical Transplantation. 38(11):e15478. doi:10.1111/ctr.15478. Epub 2024 Nov 8.**
    b. **IB17-04** Donor whole blood DNA methylation is not a strong predictor of acute graft versus host disease in unrelated donor allogeneic haematopoietic cell transplantation. Webster AP, Ecker S, Moghul I, Liu X, Dhami P, Marzi S, Paul DS, Kuxhausen M, Lee SJ, Spellman SR, Wang T, Feber A, Rakyan V, Peggs KS, Beck S**. Frontiers in Genetics. doi:10.3389/fgene.2024.1242636. Epub 2024 Apr 3. PMC11021570.**
    c. **IB18-04b** Donor KIR genotype based outcome prediction after allogeneic stem cell transplantation: No land in sight. Schetelig J, Baldauf H, Heidenreich F, Hoogenboom JD, Spellman SR, Kulagin A, Schroeder T, Sengeloev H, Dreger P, Forcade E, Vydra J, Wagner-Drouet EM, Choi G, Paneesha S, Miranda NAA, Tanase A, de Wreede LC, Lange V, Schmidt AH, Sauter J, Fein JA, Bolon YT, He M, Marsh SGE, Gadalla SM, Paczesny S, Ruggeri A, Chabannon C, Fleischhauer K. **Frontiers in Immunology. 15:1350470. doi:10.3389/fimmu.2024.1350470. Epub 2024 Apr 2. PMC11019434.**
    d. **IB20-03** The health risk of social disadvantage is transplantable into a new host. Turcotte LM, Wang T, Beyer KM, Cole SW, Spellman SR, Allbee-Johnson M, Williams E, Zhou Y, Verneris MR, Rizzo JD, Knight JM. **Proceedings of the National Academy of Sciences of the United States of America. 2024 Jul 23; 121(30):e2404108121. doi:10.1073/pnas.2404108121. Epub 2024 Jul 15. PMC11287259.**
    e. **IB20-03** Transcriptional Indicators of Social Determinants of Health and Cancer Outcomes: Donor Socioeconomic Disadvantage and Recipient Mortality Following Allogeneic Hematopoietic Cell Transplantation (J Knight). ***Oral Presentation, ASPO 2024.***
    f. **IB22-01** Post-Transplantation Cyclophosphamide Improves Graft-versus-Host Disease-Free, Relapse-Free Survival In HLA-DPB1 Mismatched Unrelated Donor Allogeneic Transplant (S McCurdy/A Blouin/ E Fuchs/ U Ibrahim). ***Submitted. Poster Presentation, EBMT 2024.***
    g. **IB22-03** Superior Disease Control with Younger Matched Unrelated Donor Vs Older Matched Sibling Donor in Recipients ≥50-years with ALL, AML, or MDS using CNI-based GVHD prophylaxis (K Nath/ B Shaffer/ H Choe). ***Submitted. Oral Presentation, EBMT 2024.***
    h. **IB22-03** Young Matched Unrelated Donors Should be Prioritized Over Older-Aged Matched Sibling Donors and Young Haploidentical Donors in Allogeneic Transplantation with Post-Transplant Cyclophosphamide in Recipients ≥50-years (K Nath). ***Oral Presentation, EBMT 2024***.
    i. **IB23-01** Immunopeptidome divergence between mismatched HLA and outcome of haploidentical HCT (P Crivello/ K Fleischhauer). ***Oral Presentation, ASH 2024.***

- **Studies in progress (Attachment 3)**
    a. **IB18-07** Donor and recipient genomic associations with acute GVHD (V Afshar-Khargan). **Analysis.**

b. **IB21-01** Effect of HLA evolutionary divergence on survival and relapse following allogeneic hematopoietic cell transplant (C Camacho-Bydume/ D Chowell/ K Hsu). **Manuscript Preparation.**
c. **IB21-02** DISCOVeRY-BMT: Multi-ethnic high-throughput study to identify novel non-HLA genetic contributors to mortality after blood and marrow transplantation. (Theresa Hahn/Alyssa Clay-Gilmour) **Ongoing.**
d. **IB22-02** Effect of SIRPα mismatch on the outcome of allogeneic hematopoietic stem cell transplantation from an HLA matched related donor (J Zou/ S Srour). **Data File Preparation.**
e. **IB23-01** Immunopeptidome divergence between mismatched HLA and outcome of haploidentical HCT (P Crivello). **Manuscript Preparation.**
f. **IB23-02** Younger MMUD vs older haploidentical donor HCT. (R Mehta). **Manscript Preparation.**
g. **IB23-03** Impact of adherence to cord blood guidelines. (L Metheny/ F Milano). **Analysis.**
h. **IB24-01** 6-locus HLA immunopeptidome divergence and outcome of mismatched unrelated HCT (E Arrieta-Bolaños/ K Fleischhauer). **Protocol Pending.**
i. **IB24-02** Effect of donor KIR and donor KIR ligand on CD8+ T cell-mediated alloreactivity in unrelated HCT for AML, ALL and MDS (B Asquith). **Protocol Pending.**

- **Study Presentation** **Esteban Arrieta-Bolaños** 1:15– 1:30pm
  a. **IB23-03** Impact of adherence to cord blood guidelines. (L Metheny/ F Milano) **Dr. Leland Metheny will present.**

- **Future/proposed studies** **Cara Benjamin & Jennifer Saultz** 1:30 – 2:55pm
  a. **Voting guidelines**
  b. **Proposal presentations (5)**
    - **PROP 2401-02** Autoimmune HLA alleles predict superior outcomes in patients receiving allogeneic hematopoietic stem cell transplantation (H Carter/R Kurzrock) (Attachment 4) **Dr. Hannah Carter will present.**
      - *Key Points:*
        - *Autoimmune HLA alleles are associated with lower risk of developing certain solid tumors and later age at diagnosis*.
        - *These alleles may confer superior antitumor immunity and contribute to robust graft versus leukemic activity*.
        - *Preliminary data suggests these alleles are associated with superior relapse-free survival and overall survival in patients with acute myeloid leukemia (AML) and myelodysplastic syndrome (MDS)*.
        - *Proposal to study a larger group of patients to determine if these alleles are protective across different diseases and can guide optimal donor selection*.
    - **PROP 2407-02** The impact of HNA alloimmunization on engraftment failure in unrelated hematopoietic stem cell transplantation (D Fuerst/ H Schrezenmeier) **(Attachment 5) Dr. Daniel Fuerst will present.**
      - *Key Points:*
        - *HNA alloantigen system may induce antibodies affecting neutrophil engraftment*.

- *Higher rates of post-engraftment neutropenia and failure to achieve full myeloid chimerism observed in patients positive for HNA immunization.*
- *Proposal for a retrospective observational case-control study to evaluate the impact of HNA immunization on engraftment and survival endpoints.*

- **PROP 2410-76** Haploidentical donor selection for patients with Aplastic Anemia: HLA and non-HLA factors (R Mehta/ A Ruggeri) **(Attachment 6) Dr. Rohtesh Mehta will present.**
  - *Key Points:*
    - *Increasing use of haploidentical donor transplants for aplastic anemia with improving outcomes.*
    - *Proposal to assess which HLA and non-HLA factors predict overall survival in patients with aplastic anemia undergoing haploidentical donor transplant.*
    - *Study to include patients from CIBMTR and EBMT registries.*
- **PROP 2410-77** The role of HLA class II mismatched HCT in patients with high-risk acute leukemia (R Mehta/ A Ruggeri) **(Attachment 7) Dr. Rohtesh Mehta will present.**
  - *Key Points:*
    - *Hypothesis that class II mismatched donors may lower the risk of relapse in high-risk acute leukemia patients.*
    - *Proposal to study patients with high-risk AML and ALL transplanted with class II matched and mismatched donors.*
    - *Analysis to include various conditioning intensities and graft sources.*
- **PROP 2410-82/ 2410-153** The Role of Inhibitory KIR Scoring and NK Cell Alloreactivity In MUD and Haplo-HSCT with Post-Transplant Cyclophosphamide. (J Zou/ S Ciurea/ E Krieger/ A Toor) **(Attachment 8) Dr. Elizabeth Krieger will present.**
  - *Key Points:*
    - *NK cells reconstitute early after transplant and their alloreactivity is influenced by killer immunoglobulin-like receptors (KIR).*
    - *Previous studies show increased inhibitory KIR content is associated with improved outcomes in conventional GVHD prophylaxis settings.*
    - *Proposal to study the impact of inhibitory KIR content in the PTCy setting for AML and MDS patients.*

c. **Dropped Proposals (9)**
- **PROP 2408-02** Cord blood viability and total nucleated cell (TNC) counts as predictors of engraftment and Graft-versus-Host Disease (A Dreyzin/ A Keating). **Dropped due to overlap with current study/publication.**
- **PROP 2408-13** Does Graft CD3+CD4/CD3+CD8 Ratio Affect Chronic Graft Versus Host Disease? (M Pamukcuoglu**). Dropped due to lower scientific impact.**

- **PROP 2409-12** Impact of early CD4/CD8 T cell recovery on post-AlloSCT r ates of infection and GVHD in Lymphoma patients - a CIBMTR analysis (N Hossain). **Dropped due to supplemental data needed.**
- **PROP 2409-15** Comparative Outcomes of Highly Human Leukocyte Antigen (HLA)-Mismatched Unrelated Donors Versus Matched and Single Locus Mismatched Unrelated Donors in Hematopoietic Cell Transplantation with Post-Transplant Cyclophosphamide (PTCY) (M Ellithi/ B Shaffer). **Dropped due to small sample size.**
- **PROP 2409-21** Impact of different HLA alleles on GVHD and GVL after sex mismatched allo HCT (A Ali). **Dropped due to lower scientific impact.**
- **PROP 2410-78** Unrelated Donor Selection with Post-Transplant Cyclophosphamide-based Graft-versus-Host Disease Prophylaxis (R Mehta/ A Ruggeri). **Dropped due to overlap with current study/publication.**
- **PROP 2410-131** Association of HLA mismatching and data-driven GVHD grading in unrelated donor HCT (A Turki/ E Arrieta-Bolanos). **Dropped due to lower scientific impact.**
- **PROP 2410-158** Refinement of HLA-DPB1 Permissiveness with Molecular Mismatch Algorithms in Allogeneic Hematopoietic Stem Cell Transplantation in the PTCy Era (J Zou/ R Saliba). **Dropped due to lower scientific impact.**
- **PROP 2410-229** What is the Optimal Donor in the Post-transplant Cyclophosphamide Era: An Older 8/8 Matched Related Donor or Matched Unrelated Donor versus a Younger 7/8 Mismatched Unrelated Donor? (G Fatobene/ V Rocha). **Dropped due to overlap with current study/publication.**

- **Closing Remarks** **Yung-Tsi Bolon** 2:55pm

Unrelated Donor HCT Research Sample Inventory - Summary for First Allogeneic Transplants in CRF and TED with biospecimens available through the CIBMTR Repository stratified by availability of paired samples, recipient only samples and donor only samples, Biospecimens include: whole blood, serum/plasma and limited quantities of viable cells and cell lines (collected prior to 2006), Specific inventory queries available upon request through the CIBMTR Immunobiology Research Program

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Number of patients	52147	28252	13886
Source of data			
CRF	26120 (50)	9911 (35)	6049 (44)
TED	26027 (50)	18341 (65)	7837 (56)
Number of centers	269	246	400
Disease at transplant			
AML	18232 (35)	10649 (38)	4659 (34)
ALL	7447 (14)	3394 (12)	2177 (16)
Other leukemia	1515 (3)	516 (2)	341 (2)
CML	3644 (7)	1331 (5)	1086 (8)
MDS	8027 (15)	5686 (20)	1874 (13)
Other acute leukemia	594 (1)	340 (1)	163 (1)
NHL	4508 (9)	1890 (7)	1018 (7)
Hodgkin Lymphoma	987 (2)	318 (1)	230 (2)
Plasma Cell Disorders, MM	960 (2)	310 (1)	215 (2)
Other malignancies	61 (<1)	14 (<1)	23 (<1)
Breast cancer	7 (<1)	3 (<1)	1 (<1)
SAA	1706 (3)	856 (3)	609 (4)
Inherited abnormalities erythrocyte diff fxn	733 (1)	256 (1)	226 (2)
Inherited bone marrow failure syndromes	79 (<1)	100 (<1)	47 (<1)
Hemoglobinopathies	48 (<1)	56 (<1)	27 (<1)
Paroxysmal nocturnal hemoglobinuria	6 (<1)	12 (<1)	6 (<1)
SCIDs	918 (2)	473 (2)	417 (3)
Inherited abnormalities of platelets	45 (<1)	22 (<1)	13 (<1)
Inherited disorders of metabolism	316 (1)	108 (<1)	172 (1)
Histiocytic disorders	415 (1)	164 (1)	150 (1)
Autoimmune disorders	36 (<1)	44 (<1)	18 (<1)
MPN	1811 (3)	1693 (6)	392 (3)
Others	52 (<1)	17 (<1)	22 (<1)
AML Disease status at transplant			
CR1	10313 (57)	7148 (67)	2436 (52)
CR2	3375 (19)	1683 (16)	904 (19)
CR3+	364 (2)	139 (1)	106 (2)
Advanced or active disease	3996 (22)	1639 (15)	1066 (23)

Refresh Date: Dec 2025

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Missing	184 (1)	40 (<1)	147 (3)
ALL Disease status at transplant			
CR1	3782 (51)	2059 (61)	945 (43)
CR2	2109 (28)	838 (25)	633 (29)
CR3+	614 (8)	214 (6)	201 (9)
Advanced or active disease	860 (12)	259 (8)	277 (13)
Missing	82 (1)	24 (1)	121 (6)
MDS Disease status at transplant			
Early	1664 (21)	1027 (18)	409 (22)
Advanced	5316 (66)	4226 (74)	1091 (58)
Missing	1047 (13)	433 (8)	374 (20)
NHL Disease status at transplant			
CR1	668 (15)	426 (23)	157 (15)
CR2	865 (19)	391 (21)	169 (17)
CR3+	405 (9)	186 (10)	93 (9)
PR	446 (10)	111 (6)	99 (10)
Advanced	2031 (45)	750 (40)	466 (46)
Missing	73 (2)	18 (1)	31 (3)
Recipient age at transplant			
0-9 years	4219 (8)	1566 (6)	1752 (13)
10-17 years	3346 (6)	1209 (4)	1237 (9)
18-29 years	6115 (12)	2470 (9)	1785 (13)
30-39 years	5730 (11)	2463 (9)	1603 (12)
40-49 years	7624 (15)	3311 (12)	1951 (14)
50-59 years	10532 (20)	5263 (19)	2375 (17)
60-69 years	11535 (22)	8488 (30)	2536 (18)
70+ years	3046 (6)	3482 (12)	647 (5)
Median (Range)	49 (0-84)	57 (0-84)	43 (0-84)
Recipient race			
White	45472 (91)	24731 (91)	10192 (87)
Black or African American	2540 (5)	1147 (4)	691 (6)
Asian	1405 (3)	859 (3)	661 (6)
Native Hawaiian or other Pacific Islander	80 (<1)	39 (<1)	48 (<1)
American Indian or Alaska Native	213 (<1)	127 (<1)	70 (1)
Other	49 (<1)	27 (<1)	28 (<1)
More than one race	320 (1)	184 (1)	74 (1)
Unknown	2068 (N/A)	1138 (N/A)	2122 (N/A)
Recipient ethnicity			
Hispanic or Latino	4496 (10)	2200 (9)	1302 (11)

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Non Hispanic or non-Latino	39733 (88)	23054 (90)	7386 (63)
Non-resident of the U.S.	894 (2)	312 (1)	2952 (25)
Unknown	7024 (N/A)	2686 (N/A)	2246 (N/A)
Recipient sex			
Male	30213 (58)	16592 (59)	8251 (59)
Female	21934 (42)	11660 (41)	5635 (41)
Karnofsky score			
10-80	18511 (35)	11453 (41)	4433 (32)
90-100	31769 (61)	16064 (57)	8777 (63)
Missing	1867 (4)	735 (3)	676 (5)
HLA-A B DRB1 groups - low resolution			
<=3/6	33 (<1)	129 (<1)	11 (<1)
4/6	336 (1)	196 (1)	95 (1)
5/6	7308 (14)	3629 (13)	2009 (15)
6/6	43950 (85)	23052 (85)	10876 (84)
Unknown	520 (N/A)	1246 (N/A)	895 (N/A)
High-resolution HLA matches available out of 8			
<=5/8	916 (2)	203 (1)	95 (1)
6/8	1918 (4)	342 (1)	285 (3)
7/8	9748 (19)	3950 (17)	2176 (22)
8/8	38113 (75)	19160 (81)	7403 (74)
Unknown	1452 (N/A)	4597 (N/A)	3927 (N/A)
HLA-DPB1 Match			
Double allele mismatch	12928 (28)	4490 (23)	1421 (24)
Single allele mismatch	24714 (54)	10180 (52)	3098 (53)
Full allele matched	8405 (18)	4749 (24)	1345 (23)
Unknown	6100 (N/A)	8833 (N/A)	8022 (N/A)
High resolution release score			
No	16427 (32)	28182 (>99)	13376 (96)
Yes	35720 (68)	70 (<1)	510 (4)
KIR typing available			
No	38299 (73)	28227 (>99)	13815 (99)
Yes	13848 (27)	25 (<1)	71 (1)
Graft type			
Marrow	17023 (33)	5857 (21)	5094 (37)
PBSC	34988 (67)	22130 (78)	8706 (63)
BM+PBSC	27 (<1)	34 (<1)	11 (<1)
PBSC+UCB	39 (<1)	197 (1)	11 (<1)
Others	70 (<1)	34 (<1)	64 (<1)

Refresh Date: Dec 2025

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Conditioning regimen			
Myeloablative	30866 (59)	13348 (47)	8328 (60)
RIC/Nonmyeloablative	21046 (40)	14823 (52)	5380 (39)
TBD	235 (<1)	81 (<1)	178 (1)
Donor age at donation			
To Be Determined/NA	240 (<1)	573 (2)	172 (1)
0-9 years	4 (<1)	33 (<1)	1 (<1)
10-17 years	2 (<1)	11 (<1)	2 (<1)
18-29 years	26493 (51)	16448 (58)	6223 (45)
30-39 years	14635 (28)	7186 (25)	4164 (30)
40-49 years	8272 (16)	3074 (11)	2521 (18)
50+ years	2501 (5)	927 (3)	803 (6)
Median (Range)	30 (0-69)	28 (0-89)	31 (4-77)
Donor/Recipient CMV serostatus			
+/+	13243 (25)	7832 (28)	3717 (27)
+/-	6106 (12)	3591 (13)	1693 (12)
-/+	17148 (33)	8556 (30)	4247 (31)
-/-	14974 (29)	7541 (27)	3717 (27)
CB - recipient +	35 (<1)	154 (1)	10 (<1)
CB - recipient -	4 (<1)	50 (<1)	2 (<1)
CB - recipient CMV unknown	0	1 (<1)	0
Missing	637 (1)	527 (2)	500 (4)
GvHD Prophylaxis			
No GvHD Prophylaxis	224 (<1)	192 (1)	76 (1)
TDEPLETION alone	132 (<1)	51 (<1)	67 (<1)
TDEPLETION +- other	1147 (2)	325 (1)	391 (3)
CD34 select alone	324 (1)	191 (1)	120 (1)
CD34 select +- other	551 (1)	312 (1)	148 (1)
Cyclophosphamide alone	235 (<1)	99 (<1)	61 (<1)
Cyclophosphamide +- others	6203 (12)	8638 (31)	1597 (12)
FK506 + MMF +- others	5571 (11)	2339 (8)	1028 (7)
FK506 + MTX +- others(not MMF)	21357 (41)	10248 (36)	3724 (27)
FK506 +- others(not MMF,MTX)	2524 (5)	1438 (5)	512 (4)
FK506 alone	1206 (2)	547 (2)	235 (2)
CSA + MMF +- others(not FK506)	3132 (6)	1059 (4)	1096 (8)
CSA + MTX +- others(not MMF,FK506)	7032 (13)	1975 (7)	3594 (26)
CSA +- others(not FK506,MMF,MTX)	1091 (2)	342 (1)	468 (3)
CSA alone	468 (1)	134 (<1)	406 (3)
Other GVHD Prophylaxis	769 (1)	306 (1)	229 (2)

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Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Missing	181 (<1)	56 (<1)	134 (1)
Donor/Recipient sex match			
Male-Male	20961 (40)	11157 (39)	5327 (38)
Male-Female	12851 (25)	6690 (24)	3046 (22)
Female-Male	9136 (18)	5170 (18)	2851 (21)
Female-Female	8977 (17)	4769 (17)	2539 (18)
CB - recipient M	17 (<1)	112 (<1)	3 (<1)
CB - recipient F	22 (<1)	93 (<1)	9 (<1)
Missing	183 (<1)	261 (1)	111 (1)
Year of transplant			
1986-1990	347 (1)	47 (<1)	103 (1)
1991-1995	1838 (4)	439 (2)	745 (5)
1996-2000	3305 (6)	1184 (4)	1213 (9)
2001-2005	5347 (10)	1070 (4)	1880 (14)
2006-2010	9592 (18)	1921 (7)	1877 (14)
2011-2015	13348 (26)	3587 (13)	2650 (19)
2016-2020	10385 (20)	7194 (25)	2810 (20)
2021-2025	7985 (15)	12810 (45)	2608 (19)
Follow-up among survivors, Months			
N Eval	24194	17127	6810
Median (Range)	48 (0-384)	23 (0-362)	35 (0-385)

Unrelated Cord Blood HCT Research Sample Inventory - Summary for First Allogeneic Transplants in CRF and TED with biospecimens available through the CIBMTR Repository stratified by availability of paired samples, recipient only samples and donor only samples, Biospecimens include: whole blood, serum/plasma and limited quantities of viable cells and cell lines (collected prior to 2006), Specific inventory queries available upon request through the CIBMTR Immunobiology Research Program

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Number of patients	6535	1939	2412
Source of data			
CRF	4585 (70)	1190 (61)	1115 (46)
TED	1950 (30)	749 (39)	1297 (54)
Number of centers	156	145	231
Disease at transplant			
AML	2470 (38)	678 (35)	791 (33)
ALL	1345 (21)	417 (22)	530 (22)
Other leukemia	102 (2)	31 (2)	38 (2)
CML	140 (2)	38 (2)	61 (3)
MDS	594 (9)	184 (9)	193 (8)
Other acute leukemia	103 (2)	28 (1)	50 (2)
NHL	418 (6)	112 (6)	142 (6)
Hodgkin Lymphoma	104 (2)	27 (1)	35 (1)
Plasma Cell Disorders, MM	38 (1)	12 (1)	13 (1)
Other malignancies	12 (<1)	1 (<1)	3 (<1)
SAA	97 (1)	39 (2)	52 (2)
Inherited abnormalities erythrocyte diff fxn	171 (3)	51 (3)	45 (2)
Inherited bone marrow failure syndromes	10 (<1)	5 (<1)	7 (<1)
Hemoglobinopathies	3 (<1)	1 (<1)	1 (<1)
SCIDs	302 (5)	108 (6)	190 (8)
Inherited abnormalities of platelets	21 (<1)	6 (<1)	10 (<1)
Inherited disorders of metabolism	420 (6)	144 (7)	158 (7)
Histiocytic disorders	112 (2)	37 (2)	56 (2)
Autoimmune disorders	8 (<1)	0	6 (<1)
MPN	54 (1)	17 (1)	21 (1)
Others	11 (<1)	3 (<1)	10 (<1)
AML Disease status at transplant			
CR1	1311 (53)	398 (59)	410 (52)
CR2	654 (26)	164 (24)	198 (25)
CR3+	69 (3)	11 (2)	30 (4)
Advanced or active disease	428 (17)	102 (15)	147 (19)
Missing	8 (<1)	3 (<1)	6 (1)
ALL Disease status at transplant			

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
CR1	599 (45)	179 (43)	230 (43)
CR2	515 (38)	154 (37)	189 (36)
CR3+	152 (11)	59 (14)	67 (13)
Advanced or active disease	78 (6)	24 (6)	42 (8)
Missing	1 (<1)	1 (<1)	2 (<1)
MDS Disease status at transplant			
Early	179 (30)	44 (24)	76 (39)
Advanced	358 (60)	123 (67)	92 (48)
Missing	57 (10)	17 (9)	25 (13)
NHL Disease status at transplant			
CR1	66 (16)	12 (11)	28 (20)
CR2	80 (19)	28 (25)	36 (26)
CR3+	47 (11)	11 (10)	12 (9)
PR	68 (16)	12 (11)	16 (11)
Advanced	154 (37)	48 (43)	46 (33)
Missing	0	1 (1)	3 (2)
Recipient age at transplant			
0-9 years	1989 (30)	704 (36)	872 (36)
10-17 years	683 (10)	184 (9)	278 (12)
18-29 years	781 (12)	173 (9)	256 (11)
30-39 years	626 (10)	183 (9)	240 (10)
40-49 years	690 (11)	185 (10)	228 (9)
50-59 years	885 (14)	229 (12)	299 (12)
60-69 years	757 (12)	237 (12)	218 (9)
70+ years	124 (2)	44 (2)	21 (1)
Median (Range)	27 (0-83)	23 (0-84)	20 (0-85)
Recipient race			
White	4580 (74)	1334 (73)	1456 (72)
Black or African American	966 (16)	271 (15)	306 (15)
Asian	389 (6)	144 (8)	179 (9)
Native Hawaiian or other Pacific Islander	38 (1)	5 (<1)	23 (1)
American Indian or Alaska Native	63 (1)	18 (1)	25 (1)
Other	1 (<1)	1 (<1)	1 (<1)
More than one race	138 (2)	42 (2)	40 (2)
Unknown	360 (N/A)	124 (N/A)	382 (N/A)
Recipient ethnicity			
Hispanic or Latino	1378 (22)	371 (20)	412 (18)
Non Hispanic or non-Latino	4938 (78)	1460 (78)	1422 (61)
Non-resident of the U.S.	53 (1)	31 (2)	512 (22)

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Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Unknown	166 (N/A)	77 (N/A)	66 (N/A)
Recipient sex			
Male	3628 (56)	1105 (57)	1375 (57)
Female	2907 (44)	834 (43)	1037 (43)
Karnofsky score			
10-80	1738 (27)	494 (25)	601 (25)
90-100	4547 (70)	1309 (68)	1588 (66)
Missing	250 (4)	136 (7)	223 (9)
HLA-A B DRB1 groups - low resolution			
<=3/6	197 (3)	124 (7)	63 (3)
4/6	2648 (41)	719 (40)	948 (41)
5/6	2736 (43)	706 (40)	953 (42)
6/6	809 (13)	236 (13)	324 (14)
Unknown	145 (N/A)	154 (N/A)	124 (N/A)
High-resolution HLA matches available out of 8			
<=5/8	3048 (54)	765 (55)	989 (54)
6/8	1352 (24)	333 (24)	434 (24)
7/8	809 (14)	196 (14)	270 (15)
8/8	389 (7)	109 (8)	141 (8)
Unknown	937 (N/A)	536 (N/A)	578 (N/A)
HLA-DPB1 Match			
Double allele mismatch	999 (37)	193 (31)	259 (36)
Single allele mismatch	1424 (53)	368 (59)	384 (54)
Full allele matched	263 (10)	58 (9)	70 (10)
Unknown	3849 (N/A)	1320 (N/A)	1699 (N/A)
High resolution release score			
No	5006 (77)	1889 (97)	2378 (99)
Yes	1529 (23)	50 (3)	34 (1)
KIR typing available			
No	5263 (81)	1933 (>99)	2383 (99)
Yes	1272 (19)	6 (<1)	29 (1)
Graft type			
UCB	6124 (94)	1734 (89)	2265 (94)
BM+UCB	1 (<1)	0	0
PBSC+UCB	378 (6)	197 (10)	132 (5)
Others	32 (<1)	8 (<1)	15 (1)
Number of cord units			
1	5485 (84)	0	2021 (84)
2	1048 (16)	0	390 (16)

Refresh Date: Dec 2025

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
3	1 (<1)	0	0
Unknown	1 (N/A)	1939 (N/A)	1 (N/A)
Conditioning regimen			
Myeloablative	4267 (65)	1244 (64)	1519 (63)
RIC/Nonmyeloablative	2250 (34)	689 (36)	872 (36)
TBD	18 (<1)	6 (<1)	21 (1)
Donor age at donation			
To Be Determined/NA	5148 (79)	814 (42)	1942 (81)
0-9 years	1076 (16)	868 (45)	372 (15)
10-17 years	60 (1)	98 (5)	23 (1)
18-29 years	75 (1)	46 (2)	17 (1)
30-39 years	66 (1)	45 (2)	27 (1)
40-49 years	52 (1)	30 (2)	13 (1)
50+ years	58 (1)	38 (2)	18 (1)
Median (Range)	5 (0-72)	5 (0-73)	4 (0-67)
Donor/Recipient CMV serostatus			
+/+	0	0	1 (<1)
-/-	0	0	1 (<1)
CB - recipient +	4108 (63)	1182 (61)	1472 (61)
CB - recipient -	2324 (36)	687 (35)	860 (36)
CB - recipient CMV unknown	103 (2)	70 (4)	78 (3)
GvHD Prophylaxis			
No GvHD Prophylaxis	25 (<1)	10 (1)	17 (1)
TDEPLETION alone	1 (<1)	0	0
TDEPLETION +- other	27 (<1)	9 (<1)	9 (<1)
CD34 select alone	0	2 (<1)	1 (<1)
CD34 select +- other	308 (5)	156 (8)	86 (4)
Cyclophosphamide alone	0	0	1 (<1)
Cyclophosphamide +- others	19 (<1)	11 (1)	13 (1)
FK506 + MMF +- others	1956 (30)	633 (33)	507 (21)
FK506 + MTX +- others(not MMF)	218 (3)	58 (3)	78 (3)
FK506 +- others(not MMF,MTX)	237 (4)	69 (4)	94 (4)
FK506 alone	148 (2)	42 (2)	27 (1)
CSA + MMF +- others(not FK506)	2956 (45)	760 (39)	1157 (48)
CSA + MTX +- others(not MMF,FK506)	100 (2)	30 (2)	51 (2)
CSA +- others(not FK506,MMF,MTX)	341 (5)	116 (6)	241 (10)
CSA alone	50 (1)	19 (1)	74 (3)
Other GVHD Prophylaxis	137 (2)	21 (1)	46 (2)
Missing	12 (<1)	3 (<1)	10 (<1)

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Donor/Recipient sex match			
Male-Female	0	0	1 (<1)
Female-Male	0	0	1 (<1)
CB - recipient M	3628 (56)	1105 (57)	1373 (57)
CB - recipient F	2907 (44)	834 (43)	1036 (43)
CB - recipient sex unknown	0	0	1 (<1)
Year of transplant			
1996-2000	1 (<1)	2 (<1)	5 (<1)
2001-2005	112 (2)	85 (4)	34 (1)
2006-2010	1847 (28)	427 (22)	623 (26)
2011-2015	2679 (41)	513 (26)	839 (35)
2016-2020	1340 (21)	528 (27)	553 (23)
2021-2025	556 (9)	384 (20)	358 (15)
Follow-up among survivors, Months			
N Eval	3247	1102	1277
Median (Range)	60 (0-196)	39 (0-213)	38 (0-240)

Related Donor HCT Research Sample Inventory - Summary for First Allogeneic Transplants in CRF and TED with biospecimens available through the CIBMTR Repository stratified by availability of paired samples, recipient only samples and donor only samples, Biospecimens include: whole blood, serum/plasma and limited quantities of viable cells and cell lines (collected prior to 2006), Specific inventory queries available upon request through the CIBMTR Immunobiology Research Program

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Number of patients	13687	2413	1156
Source of data			
CRF	4321 (32)	632 (26)	346 (30)
TED	9366 (68)	1781 (74)	810 (70)
Number of centers	97	80	69
Disease at transplant			
AML	4487 (33)	768 (32)	409 (35)
ALL	2299 (17)	490 (20)	209 (18)
Other leukemia	232 (2)	46 (2)	19 (2)
CML	396 (3)	59 (2)	28 (2)
MDS	1810 (13)	297 (12)	159 (14)
Other acute leukemia	214 (2)	39 (2)	12 (1)
NHL	1106 (8)	208 (9)	101 (9)
Hodgkin Lymphoma	238 (2)	44 (2)	29 (3)
Plasma Cell Disorders, MM	276 (2)	43 (2)	21 (2)
Other malignancies	25 (<1)	0	1 (<1)
Breast cancer	1 (<1)	0	0
SAA	679 (5)	106 (4)	45 (4)
Inherited abnormalities erythrocyte diff fxn	503 (4)	71 (3)	17 (1)
Inherited bone marrow failure syndromes	57 (<1)	7 (<1)	8 (1)
Hemoglobinopathies	319 (2)	57 (2)	20 (2)
Paroxysmal nocturnal hemoglobinuria	4 (<1)	1 (<1)	0
SCIDs	309 (2)	52 (2)	28 (2)
Inherited abnormalities of platelets	13 (<1)	0	0
Inherited disorders of metabolism	30 (<1)	8 (<1)	3 (<1)
Histiocytic disorders	79 (1)	11 (<1)	6 (1)
Autoimmune disorders	18 (<1)	0	0
MPN	577 (4)	104 (4)	41 (4)
Others	15 (<1)	2 (<1)	0
AML Disease status at transplant			
CR1	3007 (67)	529 (69)	265 (65)
CR2	673 (15)	97 (13)	50 (12)
CR3+	55 (1)	18 (2)	2 (<1)
Advanced or active disease	745 (17)	119 (15)	92 (22)

Refresh Date: Dec 2025

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Missing	7 (<1)	5 (1)	0
ALL Disease status at transplant			
CR1	1355 (59)	298 (61)	131 (63)
CR2	697 (30)	130 (27)	56 (27)
CR3+	150 (7)	35 (7)	10 (5)
Advanced or active disease	97 (4)	27 (6)	12 (6)
MDS Disease status at transplant			
Early	312 (17)	44 (15)	27 (17)
Advanced	1425 (79)	230 (77)	123 (77)
Missing	73 (4)	23 (8)	9 (6)
NHL Disease status at transplant			
CR1	225 (20)	49 (24)	25 (25)
CR2	211 (19)	40 (19)	17 (17)
CR3+	115 (10)	26 (13)	7 (7)
PR	71 (6)	14 (7)	7 (7)
Advanced	475 (43)	78 (38)	45 (45)
Missing	5 (<1)	0	0
Recipient age at transplant			
0-9 years	1542 (11)	241 (10)	100 (9)
10-17 years	1443 (11)	199 (8)	83 (7)
18-29 years	1622 (12)	327 (14)	132 (11)
30-39 years	1042 (8)	213 (9)	122 (11)
40-49 years	1585 (12)	289 (12)	120 (10)
50-59 years	2706 (20)	506 (21)	232 (20)
60-69 years	3121 (23)	528 (22)	304 (26)
70+ years	626 (5)	110 (5)	63 (5)
Median (Range)	48 (0-82)	48 (0-81)	51 (0-83)
Recipient race			
White	10027 (78)	1626 (74)	837 (79)
Black or African American	1884 (15)	340 (15)	129 (12)
Asian	667 (5)	194 (9)	71 (7)
Native Hawaiian or other Pacific Islander	49 (<1)	9 (<1)	3 (<1)
American Indian or Alaska Native	95 (1)	16 (1)	9 (1)
More than one race	186 (1)	24 (1)	17 (2)
Unknown	779 (N/A)	204 (N/A)	90 (N/A)
Recipient ethnicity			
Hispanic or Latino	2664 (20)	594 (25)	260 (23)
Non Hispanic or non-Latino	10617 (79)	1729 (74)	841 (75)
Non-resident of the U.S.	133 (1)	28 (1)	18 (2)

Refresh Date: Dec 2025

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Unknown	273 (N/A)	62 (N/A)	37 (N/A)
Recipient sex			
Male	8010 (59)	1414 (59)	680 (59)
Female	5677 (41)	999 (41)	476 (41)
Karnofsky score			
10-80	4910 (36)	955 (40)	502 (43)
90-100	8271 (60)	1384 (57)	591 (51)
Missing	506 (4)	74 (3)	63 (5)
HLA-A B DRB1 groups - low resolution			
<=3/6	3403 (26)	585 (26)	344 (34)
4/6	1015 (8)	196 (9)	105 (10)
5/6	295 (2)	56 (2)	31 (3)
6/6	8568 (65)	1444 (63)	529 (52)
Unknown	406 (N/A)	132 (N/A)	147 (N/A)
High-resolution HLA matches available out of 8			
<=5/8	4233 (33)	722 (33)	400 (44)
6/8	191 (1)	51 (2)	14 (2)
7/8	200 (2)	37 (2)	21 (2)
8/8	8264 (64)	1357 (63)	482 (53)
Unknown	799 (N/A)	246 (N/A)	239 (N/A)
HLA-DPB1 Match			
Double allele mismatch	15 (<1)	1 (<1)	4 (1)
Single allele mismatch	3612 (40)	491 (65)	287 (67)
Full allele matched	5377 (60)	261 (35)	136 (32)
Unknown	4683 (N/A)	1660 (N/A)	729 (N/A)
High resolution release score			
No	7234 (53)	2384 (99)	1143 (99)
Yes	6453 (47)	29 (1)	13 (1)
Graft type			
Marrow	3974 (29)	528 (22)	290 (25)
PBSC	9582 (70)	1840 (76)	856 (74)
UCB	2 (<1)	15 (1)	0
BM+PBSC	22 (<1)	7 (<1)	1 (<1)
BM+UCB	52 (<1)	15 (1)	3 (<1)
PBSC+UCB	1 (<1)	2 (<1)	4 (<1)
Others	54 (<1)	6 (<1)	2 (<1)
Conditioning regimen			
Myeloablative	7617 (56)	1319 (55)	587 (51)
RIC/Nonmyeloablative	6003 (44)	1077 (45)	551 (48)

Refresh Date: Dec 2025

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
TBD	67 (<1)	17 (1)	18 (2)
Donor age at donation			
To Be Determined/NA	15 (<1)	9 (<1)	2 (<1)
0-9 years	970 (7)	142 (6)	39 (3)
10-17 years	1156 (8)	188 (8)	78 (7)
18-29 years	2584 (19)	460 (19)	260 (22)
30-39 years	2165 (16)	433 (18)	222 (19)
40-49 years	2160 (16)	382 (16)	177 (15)
50+ years	4637 (34)	799 (33)	378 (33)
Median (Range)	40 (0-82)	40 (0-79)	39 (0-80)
Donor/Recipient CMV serostatus			
+/+	5561 (41)	1076 (45)	477 (41)
+/-	1467 (11)	209 (9)	115 (10)
-/+	3460 (25)	584 (24)	302 (26)
-/-	2958 (22)	478 (20)	229 (20)
CB - recipient +	32 (<1)	18 (1)	6 (1)
CB - recipient -	23 (<1)	14 (1)	1 (<1)
Missing	186 (1)	34 (1)	26 (2)
GvHD Prophylaxis			
No GvHD Prophylaxis	198 (1)	26 (1)	16 (1)
TDEPLETION alone	141 (1)	44 (2)	17 (1)
TDEPLETION +- other	144 (1)	39 (2)	19 (2)
CD34 select alone	91 (1)	29 (1)	12 (1)
CD34 select +- other	106 (1)	35 (1)	10 (1)
Cyclophosphamide alone	81 (1)	11 (<1)	10 (1)
Cyclophosphamide +- others	5079 (37)	841 (35)	507 (44)
FK506 + MMF +- others	897 (7)	114 (5)	34 (3)
FK506 + MTX +- others(not MMF)	4530 (33)	682 (28)	358 (31)
FK506 +- others(not MMF,MTX)	892 (7)	368 (15)	77 (7)
FK506 alone	127 (1)	19 (1)	6 (1)
CSA + MMF +- others(not FK506)	256 (2)	44 (2)	19 (2)
CSA + MTX +- others(not MMF,FK506)	773 (6)	105 (4)	46 (4)
CSA +- others(not FK506,MMF,MTX)	83 (1)	11 (<1)	3 (<1)
CSA alone	84 (1)	11 (<1)	3 (<1)
Other GVHD Prophylaxis	193 (1)	25 (1)	19 (2)
Missing	12 (<1)	9 (<1)	0
Donor/Recipient sex match			
Male-Male	4539 (33)	848 (35)	396 (34)
Male-Female	2908 (21)	498 (21)	248 (21)

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Female-Male	3433 (25)	546 (23)	281 (24)
Female-Female	2748 (20)	488 (20)	224 (19)
CB - recipient M	34 (<1)	19 (1)	3 (<1)
CB - recipient F	21 (<1)	13 (1)	4 (<1)
Missing	4 (<1)	1 (<1)	0
Year of transplant			
2006-2010	613 (4)	74 (3)	56 (5)
2011-2015	3719 (27)	525 (22)	215 (19)
2016-2020	5089 (37)	910 (38)	403 (35)
2021-2025	4266 (31)	904 (37)	482 (42)
Follow-up among survivors, Months			
N Eval	8910	1577	753
Median (Range)	28 (0-150)	24 (0-124)	24 (0-148)

Haplo Donor with PtCy HCT Research Sample Inventory - Summary for First Allogeneic Transplants in CRF and TED with biospecimens available through the CIBMTR Repository stratified by availability of paired samples, recipient only samples and donor only samples, Biospecimens include: whole blood, serum/plasma and limited quantities of viable cells and cell lines (collected prior to 2006), Specific inventory queries available upon request through the CIBMTR Immunobiology Research Program

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Number of patients	3920	652	402
Source of data			
CRF	1363 (35)	195 (30)	120 (30)
TED	2557 (65)	457 (70)	282 (70)
Number of centers	77	57	52
Disease at transplant			
AML	1422 (36)	222 (34)	157 (39)
ALL	703 (18)	136 (21)	79 (20)
Other leukemia	50 (1)	9 (1)	4 (1)
CML	127 (3)	20 (3)	8 (2)
MDS	594 (15)	84 (13)	65 (16)
Other acute leukemia	62 (2)	11 (2)	5 (1)
NHL	277 (7)	65 (10)	34 (8)
Hodgkins Lymphoma	77 (2)	19 (3)	12 (3)
Plasma Cell Disorders, MM	45 (1)	1 (<1)	3 (1)
Other malignancies	10 (<1)	0	0
SAA	161 (4)	25 (4)	7 (2)
Inherited abnormalities erythrocyte diff fxn	66 (2)	9 (1)	2 (<1)
Inherited bone marrow failure syndromes	10 (<1)	1 (<1)	2 (<1)
Hemoglobinopathies	71 (2)	12 (2)	3 (1)
Paroxysmal nocturnal hemoglobinuria	2 (<1)	1 (<1)	0
SCIDs	32 (1)	5 (1)	4 (1)
Inherited abnormalities of platelets	2 (<1)	0	0
Inherited disorders of metabolism	6 (<1)	0	0
Histiocytic disorders	21 (1)	3 (<1)	3 (1)
Autoimmune disorders	5 (<1)	0	0
MPN	170 (4)	28 (4)	14 (3)
Other	7 (<1)	1 (<1)	0
AML Disease status at transplant			
CR1	925 (65)	152 (68)	97 (62)
CR2	240 (17)	31 (14)	17 (11)
CR3+	24 (2)	6 (3)	1 (1)
Advanced or active disease	232 (16)	31 (14)	42 (27)
Missing	1 (<1)	2 (1)	0
ALL Disease status at transplant			

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
CR1	385 (55)	81 (60)	48 (61)
CR2	231 (33)	39 (29)	26 (33)
CR3+	60 (9)	12 (9)	1 (1)
Advanced or active disease	27 (4)	4 (3)	4 (5)
MDS Disease status at transplant			
Early	99 (17)	11 (13)	9 (14)
Advanced	468 (79)	65 (77)	53 (82)
Missing	27 (5)	8 (10)	3 (5)
NHL Disease status at transplant			
CR1	72 (26)	12 (19)	11 (32)
CR2	66 (24)	14 (22)	7 (21)
CR3+	23 (8)	11 (17)	3 (9)
PR	3 (1)	0	1 (3)
Advanced	110 (40)	27 (42)	12 (35)
Missing	2 (1)	0	0
Recipient age at transplant			
0-9 years	310 (8)	33 (5)	24 (6)
10-17 years	356 (9)	33 (5)	12 (3)
18-29 years	534 (14)	97 (15)	56 (14)
30-39 years	299 (8)	54 (8)	46 (11)
40-49 years	434 (11)	89 (14)	34 (8)
50-59 years	703 (18)	134 (21)	76 (19)
60-69 years	985 (25)	165 (25)	118 (29)
70+ years	299 (8)	47 (7)	36 (9)
Median (Range)	51 (0-82)	52 (0-77)	53 (0-83)
Recipient race			
White	2539 (70)	369 (63)	253 (71)
Black or African American	785 (22)	161 (27)	61 (17)
Asian	202 (6)	48 (8)	30 (8)
Native Hawaiian or other Pacific Islander	8 (<1)	0	1 (<1)
American Indian or Alaska Native	35 (1)	5 (1)	4 (1)
More than one race	77 (2)	5 (1)	7 (2)
Unknown	274 (N/A)	64 (N/A)	46 (N/A)
Recipient ethnicity			
Hispanic or Latino	901 (23)	173 (27)	103 (26)
Non Hispanic or non-Latino	2921 (76)	460 (73)	283 (73)
Non-resident of the U.S.	17 (<1)	1 (<1)	4 (1)
Unknown	81 (N/A)	18 (N/A)	12 (N/A)
Recipient sex			
Male	2335 (60)	406 (62)	243 (60)
Female	1585 (40)	246 (38)	159 (40)

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
Karnofsky score			
10-80	1697 (43)	296 (45)	210 (52)
90-100	2092 (53)	329 (50)	169 (42)
Missing	131 (3)	27 (4)	23 (6)
HLA-A B DRB1 groups - low resolution			
<=3/6	2961 (76)	483 (75)	306 (77)
4/6	869 (22)	152 (24)	85 (21)
5/6	62 (2)	10 (2)	6 (2)
Unknown	28 (N/A)	7 (N/A)	5 (N/A)
High-resolution HLA matches available out of 8			
<=5/8	3673 (96)	593 (95)	346 (97)
6/8	135 (4)	33 (5)	10 (3)
Unknown	112 (N/A)	26 (N/A)	46 (N/A)
HLA-DPB1 Match			
Double allele mismatch	14 (<1)	0	4 (1)
Single allele mismatch	2882 (79)	392 (78)	235 (79)
Full allele matched	768 (21)	109 (22)	58 (20)
Unknown	256 (N/A)	151 (N/A)	105 (N/A)
High resolution release score			
No	2213 (56)	650 (>99)	400 (>99)
Yes	1707 (44)	2 (<1)	2 (<1)
Graft type			
Marrow	1481 (38)	186 (29)	125 (31)
PBSC	2433 (62)	464 (71)	277 (69)
BM+PBSC	6 (<1)	2 (<1)	0
Conditioning regimen			
Myeloablative	1775 (45)	281 (43)	168 (42)
RIC/Nonmyeloablative	2144 (55)	371 (57)	231 (57)
TBD	1 (<1)	0	3 (1)
Donor age at donation			
To Be Determined/NA	2 (<1)	0	0
0-9 years	52 (1)	3 (<1)	3 (1)
10-17 years	215 (5)	48 (7)	22 (5)
18-29 years	1241 (32)	225 (35)	134 (33)
30-39 years	1110 (28)	187 (29)	112 (28)
40-49 years	796 (20)	120 (18)	82 (20)
50+ years	504 (13)	69 (11)	49 (12)
Median (Range)	34 (0-77)	33 (1-70)	33 (7-74)
Donor/Recipient CMV serostatus			
+/+	1665 (42)	314 (48)	169 (42)
+/-	403 (10)	47 (7)	35 (9)

Variable	Samples Available for Recipient and Donor N (%)	Samples Available for Recipient Only N (%)	Samples Available for Donor Only N (%)
-/+	1063 (27)	178 (27)	114 (28)
-/-	759 (19)	109 (17)	78 (19)
Missing	30 (1)	4 (1)	6 (1)
GvHD Prophylaxis			
Cyclophosphamide alone	17 (<1)	4 (1)	3 (1)
Cyclophosphamide +- others	3903 (>99)	648 (99)	399 (99)
Donor/Recipient sex match			
Male-Male	1489 (38)	289 (44)	144 (36)
Male-Female	858 (22)	139 (21)	80 (20)
Female-Male	846 (22)	117 (18)	99 (25)
Female-Female	727 (19)	107 (16)	79 (20)
Year of transplant			
2006-2010	14 (<1)	1 (<1)	5 (1)
2011-2015	440 (12)	57 (9)	29 (8)
2016-2020	1757 (47)	264 (43)	152 (41)
2021-2025	1709 (41)	330 (48)	216 (50)
Follow-up among survivors, Months			
N Eval	2539	412	267
Median (Range)	24 (0-133)	23 (0-82)	15 (0-114)

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A RESEARCH COLLABORATION BETWEEN THE MEDICAL COLLEGE OF WISCONSIN AND NMDP

TO: Immunobiology Working Committee Members

FROM: Rohtesh Mehta, MD, MPH and Yung-Tsi Bolon, PhD; Scientific Directors for the Immunobiology Working Committee

RE: 2025-2026 Studies in Progress

IB21-01 Effect of HLA evolutionary divergence on survival and relapse following allogeneic hematopoietic cell transplant (C Camacho-Bydume/ D Chowell/ K Hsu). The goal of this study is to determine if HED of HLA class I alleles of HLA-A, -B, and -C and class II HLA-DRB1 is associated with OS and relapse in patients with AML, MDS, ALL, CML, and lymphoma following allogeneic 8/8-HLA matched unrelated HCT.

Status: **Accepted**

IB23-01 Immunopeptidome divergence between mismatched HLA and outcome of haploidentical HCT (P Crivello). The main objective of this study is to understand whether the number and/or directionality of HLA-A, -B, -C, and -DRB1 PBM mismatches on the unshared haplotype can inform outcome after haplo-HCT under GVHD prophylaxis by PTCy. Primary endpoint will be Overall Survival (OS), secondary endpoints will include relapse-free survival (RFS), transplant-related mortality (TRM), acute and chronic GVHD, relapse and neutrophil/platelet recovery.

Status: **Manuscript Preparation**

IB24-01 6-locus HLA immunopeptidome divergence and outcome of mismatched unrelated HCT (E Arrieta-Bolaños/ K Fleischhauer). The main objective of this study is to investigate the association between the number and directionality of HLA mismatches with high immunopeptidome divergence, i.e., PBM mismatches for HLA-A, -B, -C, -DRB1, -DQB1 and TCE mismatches for HLA-DPB1 with clinical outcome of MMUD HCT. Secondary objectives include investigating potential differences in risk association between HLA class I and class II mismatches in MMUD HCT and investigating the relationship between PBM and TCE group mismatches at HLA-DPB1.

Status: **Datafile preparation**

IB24-02 Effect of donor KIR and donor KIR ligand on CD8+ T cell-mediated alloreactivity in unrelated HCT for AML, ALL and MDS (B Asquith). We hypothesize that T cells from donors with a high count of iKIR-ligand pairs will have a survival advantage leading to better CD8+ T cell reconstitution in recipients. This may increase the risk of GVHD but decrease the risk of relapse and virus reactivation.

Status: **Protocol Development**

IB18-07 Donor and recipient genomic associations with acute GVHD (V Afshar-Khargan). The goal of this R01-funded study is to determine the genetic risk factors of GVHD.

Status: **Analysis**

IB22-02 Effect of SIRPα mismatch on the outcome of allogeneic hematopoietic stem cell transplantation from an HLA matched related donor (J Zou/ S Srour). This study hypothesized that SIRPα variant mismatch in HSCT may elicit a non-self recognition caused by a different binding between SIRPα-CD47. The enhanced innate immunity may further promote alloimmunity through specific effector cells and subsequentially lead to a higher risk of chronic graft-versus-host disease (cGVHD) accompanied by a lower risk of relapse.

Status: **Manuscript Preparation**

IB23-03 Impact of adherence to cord blood guidelines. (L Metheny/ F Milano). The study hypothesized that adherence to published cord blood guidelines in cord blood transplant (TNC dose, CD34 dose, HLA matching, avoiding anti-thymocyte globulin (ATG), criteria for conditioning intensities) improves clinical outcomes, including disease free survival, non-relapse mortality, relapse free survival, and overall survival when compared to non-adherence to cord blood guidelines.

Status: **Manuscript Preparation**

IB25-01 Haploidentical donor selection for patients with Aplastic Anemia: HLA and non-HLA factors (R Mehta/ A Ruggeri).

Status: **Protocol Pending**

Field	Response
Proposal Number	2509-45-KATIKANENI
Proposal Title	Impact of Novel HLA Evolutionary Divergence Score on Clinical Outcomes of AML Recipients after Haploidentical Stem Cell Transplantation
Key Words	Evolutionary divergence score, Haploidentical stem cell transplantation, Prognostic factor
Principal Investigator #1: - First and last name, degree(s)	Padma Katikaneni, MD
Principal Investigator #1: - Email address	katikanenip2@upmc.edu
Principal Investigator #1: - Institution name	University of Pittsburgh, Department of Medicine, Division of Hematology-Oncology, Pittsburgh, PA
Principal Investigator #1: - Academic rank	Clinical Fellow
Junior investigator status (defined as 欧、5 years from fellowship)	Yes
Do you identify as an underrepresented/minority?	No
Principal Investigator #2 (If applicable): - First and last name, degree(s):	Kevin Quann
Principal Investigator #2 (If applicable): - Email address:)	quannka@upmc.edu
Principal Investigator #2 (If applicable): - Institution name:	University of Pittsburgh, Department of Medicine, Division of Hematology-Oncology, Pittsburgh, PA
Principal Investigator #2 (If applicable): - Academic rank:	Assistant Professor
Junior investigator status (defined as 欧、5 years from fellowship)	Yes
Do you identify as an underrepresented/minority?	No
We encourage a maximum of two Principal Investigators per study. If more than one author is listed, please indicate who will be identified as the corresponding PI below:	Kevin Quann
Please list any ongoing CIBMTR projects that you are currently involved in and briefly describe your role.	Neither PI is currently engaged in work with CIBMTR.
Do any of the PI(s) within this proposal have a CIBMTR WC study in manuscript preparation >6 months?	No
PROPOSED WORKING COMMITTEE:	Immunobiology
Please indicate if you have already spoken with a scientific director or working committee chair regarding this study.	No

Field	Response
RESEARCH QUESTION:	We will investigate whether a new HLA evolutionary divergence (HED) score predicts clinical outcomes in patients who received haplo-identical stem cell transplantation for acute myeloid leukemia.
RESEARCH HYPOTHESIS:	We hypothesize that an HLA evolutionary divergence (HED) calculation method based on polymorphic HLA residues might improve the estimation of HLA divergence. We aim to investigate whether this polymorphic antigen-binding domain (PBD)-based HED score correlates with major transplant outcomes of haplo-SCT recipients with AML and validate these findings with larger datasets derived from the CIBMTR registry.
SPECIFIC OBJECTIVES/OUTCOMES TO BE INVESTIGATED (Include Primary, Secondary, etc.):	We propose investigating the prognostic impact of a new polymorphic domain-based HLA evolutionary divergence score (HED) in haploidentical stem cell transplantation (haplo-SCT). The primary objective is to evaluate whether HED score predicts survival after haplo-SCT, measured by overall survival at 2 years. Secondary objectives are to evaluate the relationship of HED scores to major transplant outcomes, including relapse, event-free survival, non-relapse mortality, and frequencies and grades of acute or chronic graft-versus-host disease (GVHD). Secondary endpoints include the cumulative incidence of relapse as time-to-event and at 2 years, event-free survival (EFS) as time-to-event and at 2-years, non-relapse mortality at 2 years, frequency of grade 3 or 4 acute graft-versus-host disease (aGVHD) at 12 weeks, frequency of new-onset moderate or severe chronic GVHD (cGVHD) at 1 year, and GVHD-free relapse-free survival (GRFS) at 2 years.
SCIENTIFIC IMPACT: Briefly state how the completion of the aims will impact participant care/outcomes and how it will advance science or clinical care.	If PBD-HED is shown to be predictive, it could lead to the development of a new transplant risk estimation tool, potentially changing clinical practice by guiding the selection of suitable recipients and donors and enabling tailored pre- or post-transplant interventions for high-risk patients. Ultimately, this can improve patient outcomes and advance scientific understanding of the factors influencing stem cell transplantation.

SCIENTIFIC JUSTIFICATION: Provide a background summary of previous related research and their strengths and weaknesses, justification of your research and why your research is still necessary.	In allogeneic stem cell transplantation (alloSCT), donor-derived alloreactive T cells elicit an anti-leukemic effect by recognizing leukemia cells as non-self, mediating the graft-versus-leukemia effect (GVL) (1,2). Human leukocyte antigen (HLA) typing is critical for selecting suitable donors for transplant recipients since donor-recipient HLA mismatch informs the risk of graft rejection or graft-versus-host disease (GVHD) in alloSCT (3). HLA gene loci are among the most polymorphic regions in the human genome. HLA allelic diversity ensures presentation of broad sets of peptides by antigen presenting cells to T cells to foster anti-pathogen immunity. In the context of alloSCT, HLA allelic diversity may potentially promote GVL by enabling the recruitment of greater numbers of anti-leukemia T cells clones. Indeed, while several studies have reported HLA evolutionary divergence (HED) as a predictor of clinical response to immune checkpoint inhibitors in solid tumors4,5, the clinical significance of HED in alloSCT remains uncertain, with several groups reporting conflicting data (6-8). A recent CIBMTR study investigated the effect of HED in alloSCT (IB21-01) and reported a high HED in HLA-DR was associated with better survival and lower relapse (ASH abstract 2023). In these studies and others, the most common method for quantitating HED is through calculation of Grantham distances of HLA antigen-binding domain amino acid sequences (9,10, GranthamDist: https://sourceforge.net/projects/granthamdist/). However, the presence of conserved residues among these domains in the conventional GrathamDist method can potentially underestimate clinically meaningful HLA divergence. To address this issue, we developed a new HED score calculation tool which focuses on polymorphic antigen-binding domain (PBD) residues, as summarized in Figure 1. We hypothesize that an HED calculation method based on polymorphic HLA residues might improve the prognostic utility of HLA divergence in alloSCT. To explore our hypothesis, we retrospectively analyzed acute myeloid leukemia patients who underwent haploidentical alloSCT at the University of Pittsburgh (U. Pitt) and City of Hope (COH) between 2017 and 2023. Conventional total antigen-binding domain (TBD) -based Grantham scores were calculated from antigen-binding residues of HLA class-I/II alleles included with the GranthamDist package. A new polymorphic antigen-binding domain-based Grantham score (PBD) was developed

Field	Response
	from GranthamDist, which considers only antigen-binding domain residues with intra-class Simpson Diversity Indices >0.2. Overall survival (OS), relapse rate, and non-relapse mortality (NRM) were estimated by Kaplan Meier curve and compared between low-HED (<50 percentile) and high-HED (50 percentile) scoring recipients using Log-rank analysis. Multivariate analysis was performed with Cox proportional hazard models, including known risk factors predicting post-transplant relapse, including age, conditioning intensity, disease risk index (DRI), and pre-transplant measurable residual diseases. We first analyzed the U Pitt cohort of 49 patients, with a median age of 60, most receiving reduced intensity conditioning (60.4%). Across all HLA loci, PBD-HED scores were significantly higher and diverse than TBD-HED scores (Figure 2). Survival of patients with low PBD-HED was significantly inferior to that of patients with high PBD-HED (p=0.02, HR 2.26), while TBD- HED did not predict survival (p=0.27). In multivariate analysis, low PBD-HED was an independent risk factor for survival in addition to disease risk index (DRI) and conditioning intensity. To validate the findings, we next analyzed a COH cohort (n=145) including younger recipients (median age 56) treated with myeloablative conditioning (67%). Low PBD-HED score was significantly associated with lower survival (P=0.006, HR 2.17) and higher incidence of relapse (P=0.01, HR 2.61), compared to high PBD-HED (Figure 3). Our preliminary data show this new PBD-based HED score significantly improves prediction of survival of AML patients following haplo-SCT in two independent cohorts. A low HED may foster leukemia escape from GVL through a mechanism similar what has been described in loss of HLA heterozygosity. Incorporating this new PBD-based HED score into current risk models could improve the prediction of transplant outcomes, thereby identifying patients at high-risk for relapse who might benefit from post-transplant prophylactic therapy. Our observation also implies the importance of HLA evolutionary divergence for optimal GVL and long-term leukemia control. Given our promising results, we propose investigating whether the PBD-based Grantham score correlates with major transplant outcomes in haplo-SCT recipients with acute myeloid leukemia and validating these findings using larger data derived from the CIBMTR registry.

Field	Response
SCIENTIFIC JUSTIFICATION: If applicable, upload graphic as a single file (JPG, PNG, GIF) - Id	F_1Fnb60G6Hh3UETB
SCIENTIFIC JUSTIFICATION: If applicable, upload graphic as a single file (JPG, PNG, GIF) - Name	FIgures.png
SCIENTIFIC JUSTIFICATION: If applicable, upload graphic as a single file (JPG, PNG, GIF) - Size	276843
SCIENTIFIC JUSTIFICATION: If applicable, upload graphic as a single file (JPG, PNG, GIF) - Type	image/png
PARTICIPANT SELECTION CRITERIA: State inclusion and exclusion criteria.	Inclusion criteria: 1) Age 18 years 2) Recipients of haploidentical allogeneic stem cell transplantation 3) Transplant indicated for acute myeloid leukemia Exclusion criteria: None
Does this study include pediatric patients?	No
If this study does not include pediatric patients, please provide justification:	The preliminary data has not investigated pediatric population, so it is unclear if the same hypothesis can be applied to pediatric recipients. A subsequent study focusing on pediatric population can be designed if the current study validates the primary hypothesis.
DATA REQUIREMENTS: After reviewing data on CIBMTR forms, list patient-, disease- and infusion-variables to be considered in the multivariate analyses. Outline any supplementary data required.	Patient-variables - Donor and recipient's age, sex, HLA typing (4-digit molecular typing), CMV serostatus - Recipient's co-morbidity index Disease-variables - AML disease characteristics- karyotype, FISH, molecular abnormalities - Disease risk index - Disease status at the time of transplantation- remission status, measurable residual disease status Infusion/transplant-variables - Conditioning regimen and intensity, usage of total body irradiation - Stem cell source; bone marrow or peripheral blood stem cells - Stem cell doses (total nucleated cell, CD34+, and CD3+ cells dose) - Type of GVHD prophylaxis including the usage of post-transplant cyclophosphamide Clinical outcomes - Survival, relapse, relapse-free survival, non-relapse mortality - Acute GVHD onset and maximal severity - Chronic GVHD onset and maximal severity
Types of cellular therapy data this proposal includes:	Hematopoietic Cell Transplantation (HCT)

Field	Response
PATIENT REPORTED OUTCOME (PRO) REQUIREMENTS: If the study requires PRO data collected by CIBMTR, the proposal should include: 1) A detailed description of the PRO domains, timepoints, and proposed analysis of PROs; 2) A description of the hypothesis speci	Not applicable
MACHINE LEARNING: Please indicate if the study requires methodology related to machine-learning and clinical predictions.	Not applicable
SAMPLE REQUIREMENTS: If the study requires biologic samples from the CIBMTR Repository, the proposal should also include: 1) A detailed description of the proposed testing methodology and sample requirements; 2) A summary of the investigator's previous e	Not applicable
NON-CIBMTR DATA SOURCE: If applicable, please provide: 1) A description of external data source to which the CIBMTR data will be linked; 2) The rationale for why the linkage is required.	Not applicable

REFERENCES:	1. Horowitz MM, Gale RP, Sondel PM, Goldman JM, Kersey J, Kolb HJ, Rimm AA, Ringden O, Rozman C, Speck B, et al. Graft-versus-leukemia reactions after bone marrow transplantation. Blood. 1990;75(3):555 562. 2. Bleakley M, Riddell SR. Molecules and mechanisms of the graft-versus-leukaemia effect. Nat Rev Cancer. 2004;4(5):371 380. 3. Spellman SR. Hematology 2022-what is complete HLA match in 2022? Hematology Am Soc Hematol Educ Program. 2022;2022(1):83 89. 4. Chowell D, Krishna C, Pierini F, Makarov V, Rizvi NA, Kuo F, Morris LGT, Riaz N, Lenz TL, Chan TA. Evolutionary divergence of HLA class I genotype impacts efficacy of cancer immunotherapy. Nat Med. 2019;25(11):1715 1720. 5. Chowell D, Morris LGT, Grigg CM, Weber JK, Samstein RM, Makarov V, Kuo F, Kendall SM, Requena D, Riaz N, Greenbaum B, Carroll J, Garon E, Hyman DM, Zehir A, Solit D, Berger M, Zhou R, Rizvi NA, Chan TA. Patient HLA class I genotype influences cancer response to checkpoint blockade immunotherapy. Science. 2018;359(6375):582 587. 6. Pagliuca S, Gurnari C, Hercus C, Hergalant S, Hong S, Dhuyser A, D'Aveni M, Aarnink A, Rubio MT, Feugier P, Ferraro F, Carraway HE, Sobecks R, Hamilton BK, Majhail NS, Visconte V, Maciejewski JP. Leukemia relapse via genetic immune escape after allogeneic hematopoietic cell transplantation. Nat Commun. 2023;14(1):3153. 7. Daull AM, Dubois V, Labussiere-Wallet H, Venet F, Barraco F, Ducastelle-Lepretre S, Larcher MV, Balsat M, Gilis L, Fossard G, Ghesquieres H, Heiblig M, Ader F, Alcazer V. Class I/Class II HLA Evolutionary Divergence Ratio Is an Independent Marker Associated With Disease-Free and Overall Survival After Allogeneic Hematopoietic Stem Cell Transplantation for Acute Myeloid Leukemia. Front Immunol. 2022;13:841470. 8. Roerden M, Nelde A, Heitmann JS, Klein R, Rammensee HG, Bethge WA, Walz JS. HLA Evolutionary Divergence as a Prognostic Marker for AML Patients Undergoing Allogeneic Stem Cell Transplantation. Cancers (Basel). 2020;12(7). 9. Grantham R. Amino acid difference formula to help explain protein evolution. Science. 1974;185(4154):862 864. 10. Pierini F, Lenz TL. Divergent Allele Advantage at Human MHC Genes:

Field	Response
	Signatures of Past and Ongoing Selection. Mol Biol Evol. 2018;35(9):2145 2158.
CONFLICTS OF INTEREST: Do you have any conflicts of interest pertinent to this proposal concerning?	No, I do not have any conflicts of interest pertinent to this proposal

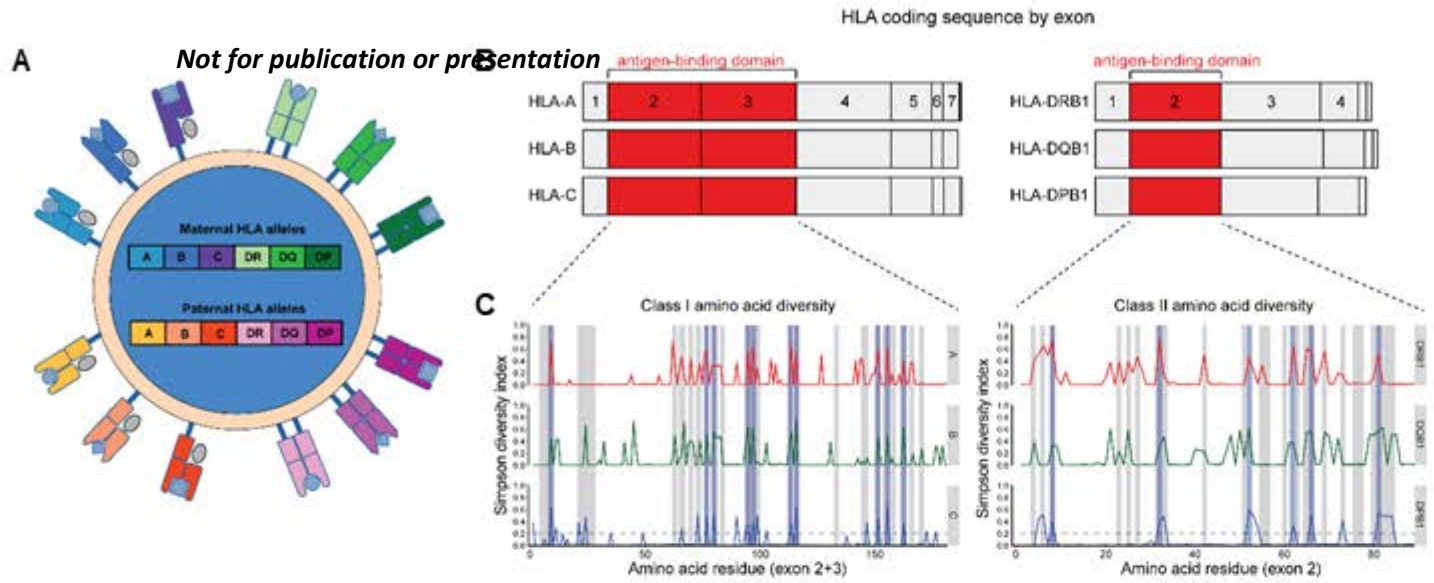

Figure 1. HLA diversity is driven by polymorphic antigen binding residues. (A) Host and recipient antigen immunopeptidomes are limited by the diversity of maternal and paternal class-I (HLA-A/B/C) and class-II (DR/DQ/DP) alleles. (B) HLA diversity occurs primarily through highly-polymorphic antigen binding domains encoded by exons 2+3 of class-I genes or exon 2 of class II genes. (C) To improve sensitivity over conventional Grantham scoring of total antigen binding domain residues (TBD, highlighted in gray), we constrained our calculations to polymorphic residues with Simpson diversity indices (SDIs) > 0.2 in all genes of the same HLA class (PBD, highlighted in blue).

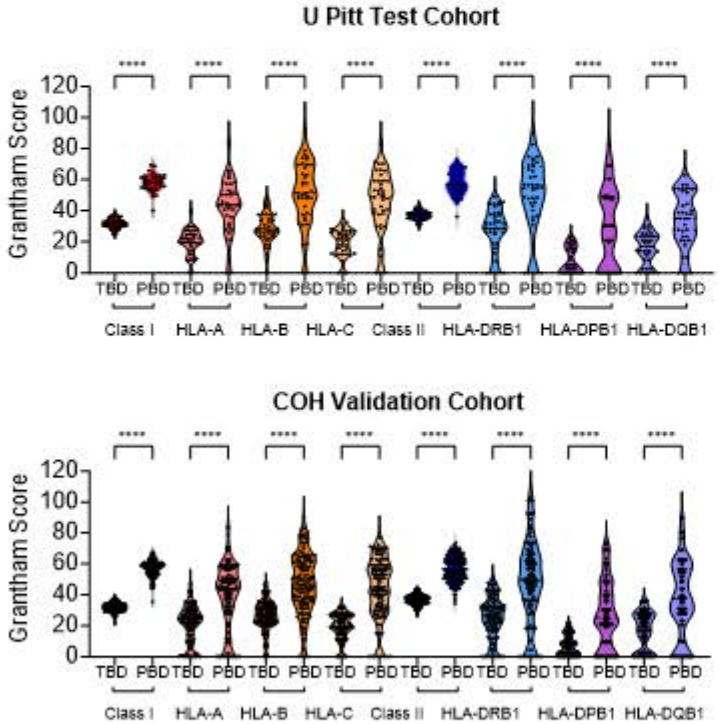

Figure 2. Comparison of Grantham HED score based on the conventional method focusing on the antigen-binding domain (TBD), or the new process, covering the polymorphic antigen-binding domain (PBD). Class I score indicates the average HED scores of HLA-A, B, and C. Class II score indicates the average HED scores of HLA-DRB1, DPB1, and DQB1. **** P<0.0001 by one-way ANOVA test.

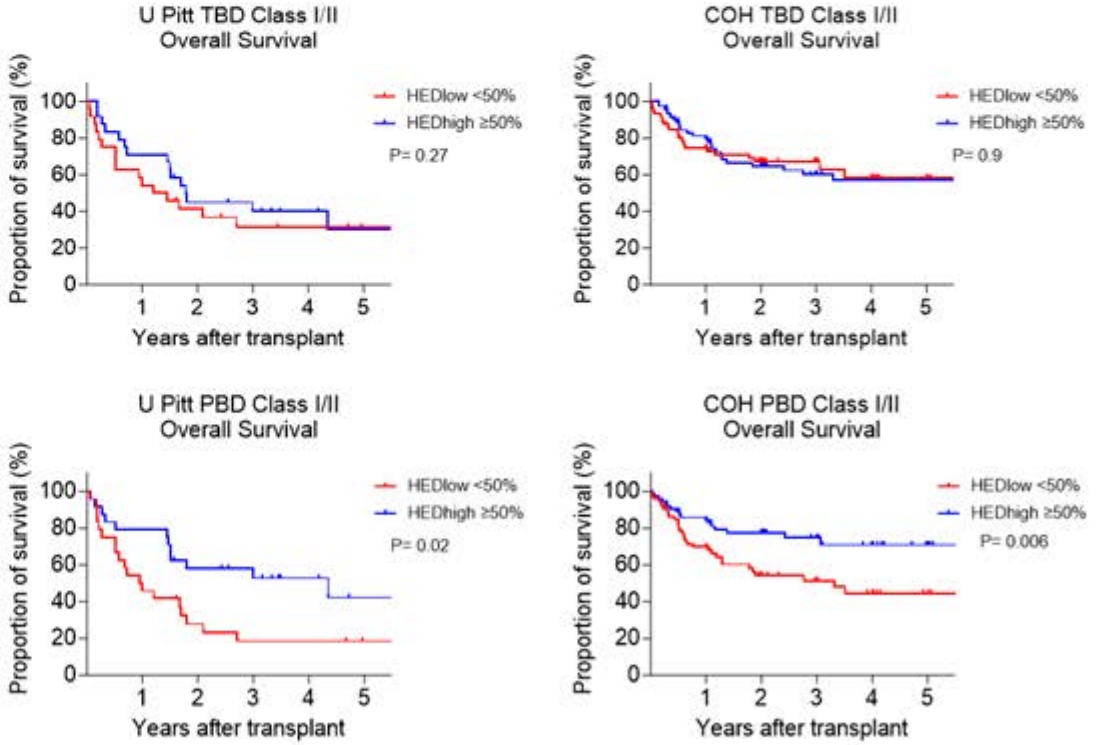

Figure 3. Comparison of overall survival, based on HLA class I/II average HED score calculated by TBD or PBD. Low HED score based on PBD was significantly associated with inferior overall survival in both the U Pitt and the COH cohorts. In contrast, TBD-based HED score did not correlate with survival.

Table 1. Adult AML Recipients (≥18 yrs) Receiving First Allogeneic HCT with Haploidentical Donors, BM or PBSC Grafts, 2017–2024

Characteristic	N (%)
No. of patients	4137
No. of centers	215
Time from diagnosis to HCT (months) - median (min-max)	5.6 (0.4-204.9)
Recipient age groups - no. (%)	
18-24	247 (6.0)
25-34	371 (9.0)
35-44	436 (10.5)
45-54	708 (17.1)
55-64	1173 (28.4)
65+	1202 (29.1)
Median (min-max); years	58.1 (18.0-82.0)
Recipient Sex - no. (%)	
Male	2376 (57.4)
Female	1761 (42.6)
Recipient Race - no. (%)	
White	2637 (63.7)
Black or African American	562 (13.6)
Asian	325 (7.9)
Native Hawaiian or other Pacific Islander	21 (0.5)
American Indian or Alaska Native	18 (0.4)
More than one race	57 (1.4)
Missing	517 (12.5)
Recipient Ethnicity - no. (%)	
Hispanic or Latino	542 (13.1)
Not Hispanic or Latino	2740 (66.2)
Non-resident of the U.S.	737 (17.8)
Missing	118 (2.9)
Graft Type - no. (%)	
Bone marrow	626 (15.1)
Peripheral blood stem cells	3511 (84.9)
Karnofsky score prior to HCT - no. (%)	
90-100%	2335 (56.4)
< 90%	1723 (41.6)
Missing	79 (1.9)
HCT-CI - no. (%)	
0	1023 (24.7)

Characteristic	N (%)
1	684 (16.5)
2	571 (13.8)
3+	1821 (44.0)
Missing	38 (0.9)
AML pre-HCT disease stage - no. (%)	
CR1	2983 (72.1)
CR2	632 (15.3)
CR3+	59 (1.4)
Advanced or active disease	458 (11.1)
Missing	5 (0.1)
ELN Cytogenetic Score - no. (%)	
Normal	163 (3.9)
Favorable	491 (11.9)
Intermediate	1281 (31.0)
Poor	2061 (49.8)
APL	18 (0.4)
TBD, review needed	50 (1.2)
Missing	41 (1.0)
HLA Match - no. (%)	
<4/8	8 (0.2)
4/8	3095 (74.8)
5/8	840 (20.3)
6/8	194 (4.7)
Center-reported Conditioning Intensity - no. (%)	
MAC	1685 (40.7)
RIC	2440 (59.0)
Missing	12 (0.3)
TBI use - no. (%)	
No	1372 (33.2)
Yes	2765 (66.8)
Donor age groups - no. (%)	
<18	144 (3.5)
18-24	703 (17.0)
25-34	1274 (30.8)
35-44	1151 (27.8)
45-54	529 (12.8)
55-64	261 (6.3)
65+	75 (1.8)

Characteristic	**N (%)**
Median (25th-75th pctl); years	34.6 (26.6 – 43.4)
Donor/recipient sex match - no. (%)	
M-M	1540 (37.2)
M-F	1001 (24.2)
F-M	836 (20.2)
F-F	760 (18.4)
Donor/recipient CMV serostatus - no. (%)	
+/+	1818 (43.9)
+/-	296 (7.2)
-/+	1180 (28.5)
-/-	800 (19.3)
Missing	43 (1.0)
Completed any CRF follow up form - no. (%)	
No	3439 (83.1)
Yes	698 (16.9)
Year of Transplant - no. (%)	
2017	317 (7.7)
2018	429 (10.4)
2019	465 (11.2)
2020	570 (13.8)
2021	554 (13.4)
2022	553 (13.4)
2023	641 (15.5)
2024	608 (14.7)
Follow-up (months) - median (25th-75th pctl)	36.3 (14.2-59.0)